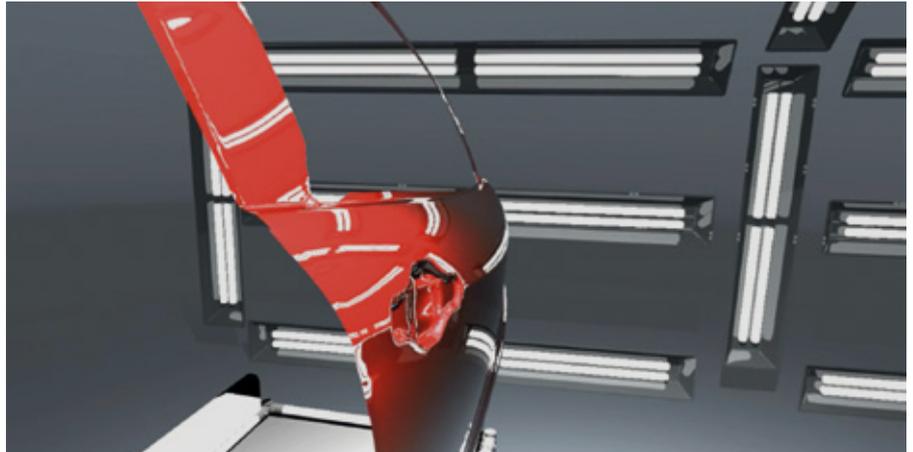# PAM-STAMP

Sheet Metal Forming: from Concept Development to Try-Out & Manufacturing of Assemblies

Expertise

• Ease of use, combined with an accurate and super-fast solver, validated by OEM's and suppliers

• Line-, transfer- and progressive dies, marriage of closures, clamping, gluing & joining, (roll) hemming, warm and hot stamping, stretch forming, tube bending, hydro- and super plastic forming and many more used in aerospace, electronics and appliance industry

• Hemming and patch blank with elastic components, deformable tools, solid blank for thick material

• Accurate detection of surface defects – for a part or as assembled and built in including gravity - with powerful analysis tools and realistic light inspection

"With the latest version of ESI PAM-STAMP 2017, considerable efficiency improvements have been achieved when working with complete line dies. Importing the geometry, setting up, and analyzing line die simulations has become as fast, easy and straight-forward as when working with only one operation! It is a huge step forward and makes working with ESI's sheet metal forming solution PAM-STAMP even more enjoyable and efficient"

Arlem Picinin
AETHRA
Brazil

Surface quality analysis in a virtual light room with ESI PAM-STAMP

Simulate sheet metal forming and assembly of components, like doors and closures

ESI PAM-STAMP offers innovative tools to help engineers eliminate uncertainties before entering the physical try-out phase and predicts the perceived quality after the assembly process of the full component. It spans from quick iterations on the part design, through forming process engineering to try-out validation and high-precision assembly of closure panels. All of that allows you to recognize and correct as-built distortion, surface quality, and/or gap- & flush in assembly.

Manage the development of any stamped product and process

PAM-STAMP combines a process driven, easy-to-use, and intuitive Graphical User Interface (GUI), with a solver that delivers the highest accuracy. You can simulate the manufacturing of large flexible panels and high strength structural parts for automotive, and applications for the aerospace, electronics, and appliance industries. The solution offers realistic, accurate and predictive simulations of cold, warm, and hot sheet metal forming processes.

Remove any uncertainty from try-out testing

The latest material models in PAM-STAMP allow the definition of complex material behavior based on inputs available from tensile tests. A massive parallel solver allows for the usage of many cores and thus a very fine blank mesh resulting in no tool penetration, especially for large outer panels. There is no compromise necessary to model tools, physical beads, contact and friction. As a result, PAM-STAMP delivers an absolute accurate prediction of springback, thinning, splitting, compression, wrinkling, trim line location, surface defects and effects of die compensation.

Key Applications & Processes

Accurate Springback, Die Compensation, and CAD Surface Reconstruction

Based on accurately computed springback, after drawing or following operations, PAM-STAMP can adjust the die face geometry of each affected die automatically and for as many loops as needed, until the desired tolerance is reached. After full die face compensation, the modified CAD surfaces can be quickly produced with high quality for transfer back to the CAD/CAM system.
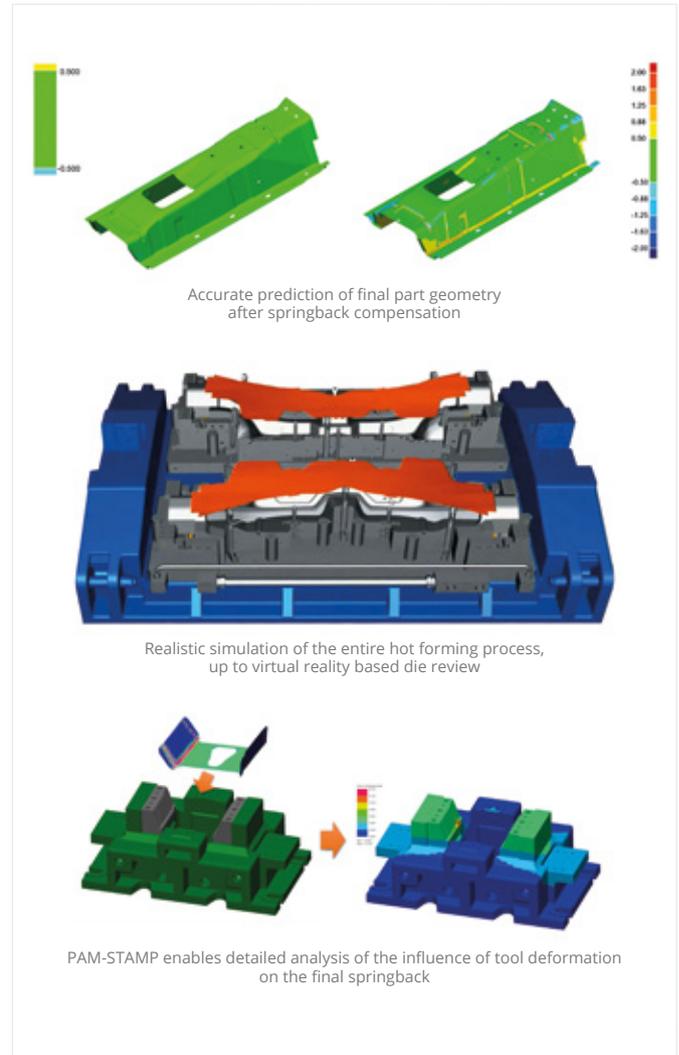
Warm & Hot Forming

One of PAM-STAMP's strengths is the modeling of warm and hot forming processes using Boron-alloyed steels, Titanium alloys, and high strength Aluminum grades, such as the 7000 series. Every step of the process is covered - heating of the blank, transport from the furnace to the die set, forming, in-die quenching, ambient cooling, and cooling channel design analysis, before producing physical tools. Evaluate and optimize various design criteria, like tool temperatures, quenching times and pressures, and cycle times for process outcomes like thickness, wrinkling and splitting, and phase transformations and final part strengths. You can go beyond the standard part to work with tailor-welded, tailor-rolled and patch blanks, which are supported through the streamlined workflow and dedicated process macros in the intuitive graphical interface.

Elastic Tool Deformation Analysis

Investigating springback is crucial during the process development cycle. The final deviation from nominal geometry should be minimized to ensure good assembly conditions later in the production process. To achieve the highest springback accuracy, PAM-STAMP's solver is designed to efficiently combine deformable solid tools and classic stamping models to analyze the elastic tool deformations occurring during the forming process. Tool deflections can have dramatic influence on final springback results. Realistically modeled tool behavior in simulation provides accurate force distribution between the blank and tools. This is particularly needed to reliably validate stamping processes of high strength structural parts and large outer panels.

Accurate prediction of final part geometry after springback compensation

Realistic simulation of the entire hot forming process, up to virtual reality based die review

PAM-STAMP enables detailed analysis of the influence of tool deformation on the final springback

for more information
www.esi-group.com/PAM-STAMP

ABOUT ESI GROUP

ESI Group is a leading innovator in Virtual Prototyping software and services. Specialist in material physics, ESI has developed a unique proficiency in helping industrial manufacturers replace physical prototypes by virtual prototypes, allowing them to virtually manufacture, assemble, test and pre-certify their future products. Coupled with the latest technologies, Virtual Prototyping is now anchored in the wider concept of the Product Performance Lifecycle™, which addresses the operational performance of a product during its entire lifecycle, from launch to disposal. The creation of a Hybrid Twin™, leveraging simulation, physics and data analytics, enables manufacturers to deliver smarter and connected products, to predict product performance and to anticipate maintenance needs. ESI is a French company listed in compartment B of NYSE Euronext Paris. Present in more than 40 countries, and addressing every major industrial sector, ESI Group employs about 1200 high-level specialists around the world and reported annual sales of €141 million in 2016. For more information, please visit www.esi-group.com.