



Gestamp successfully brings to market a weight-optimized B-pillar stamped from tailored blank using PAM-STAMP 2G

THE CHALLENGE

Tailored blanks offer a good possibility to optimize the weight and strength of automotive parts. In the present case, a B-pillar had to be manufactured with 3 different material thicknesses, welded together with 2 weld lines.

The forming behavior and springback of tailored blanks are quite different from normal stamped parts. This needed to be considered, along with the compensation for the die.

The challenge was to manufacture the part right the first time within given tolerances and with good surface quality.

THE BENEFITS

- Complete virtual modeling of a complex manufacturing process,
- High precision on the first formed physical parts and tolerances met,
- Movements of the weld lines accurately anticipated in tool design,
- Valuable local support from ESI Brazil throughout the project.

"We achieved very good results thanks to the accuracy of the simulation using PAM-STAMP 2G. We were able to use the springback prediction tool to evaluate the die compensation, despite the complexity of such a case with three different thicknesses and two weld lines."

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B-pillar stamped from tailored blank with 3 thicknesses and 2 weld lines (visible)

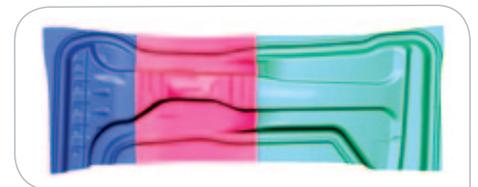
Gestamp Automoción was entrusted with the design of a stamped automotive B-pillar defined with three different thicknesses. This was bound to bring a huge complexity to the stamping tool design in order to take into account the formability of each region of the tailored blank as well as the two weld lines.

Among the toolmakers consulted for this challenge in Brazil, Gestamp Paraná was nominated to develop this complex stamping process in Brazil, in spite of the additional difficulty linked to the three different thicknesses.

Indeed, to add to the challenging geometry of the part itself, the complexity of the weld lines movement during forming needed to be considered as well. When the tool closes, the weld lines move constantly, and the tool geometry had to be adapted accordingly.



Transitions between different thicknesses must be seamless to reach required surface quality



Geometry of weld lines after forming

Due to the complexity of the simulation to be performed in PAM-STAMP 2G involving multiple thicknesses and weld lines Gestamp called upon ESI's Brazilian support team to assist them in this task and to ensure that they would reach the best result in the shortest time.

Given the quality of the collaboration with the local ESI technical support team in Brazil, Gestamp extended the cooperation to include also springback calculation and die compensation using the explicit solver in PAM-STAMP 2G.

To ensure good die compensation, Gestamp engineers made sure the strain distribution in the part was as smooth as possible.

This was particularly difficult in a part with 3 different thicknesses.

Once the appropriate parameters were set, the springback was calculated with the tailored blank properties. The resulting tolerances were far from the required 0.7 mm.

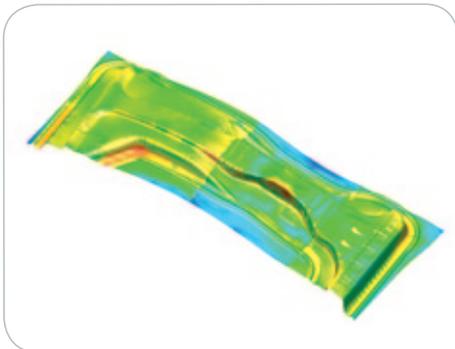
The team then used PAM-STAMP 2G to compensate the tools and only a small region was still out of tolerance, located beyond the trim line. This was acceptable as it would be cut off

the final part. The majority of the part was well inside the required tolerance.

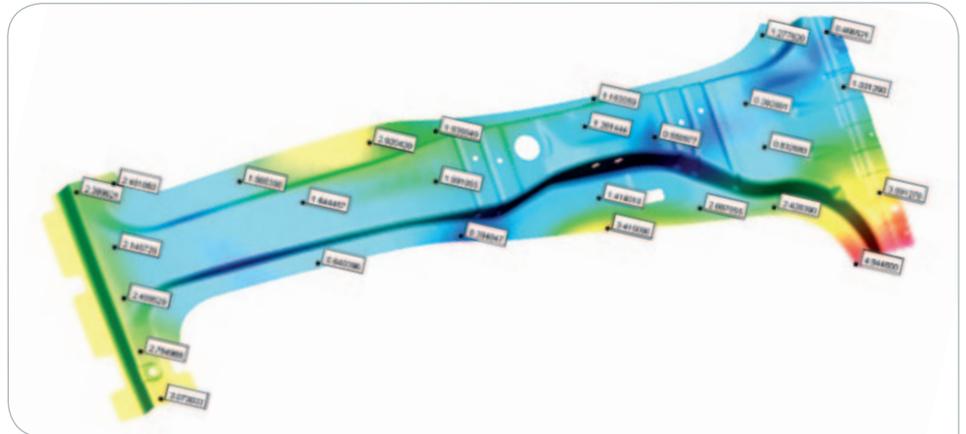
After reaching such satisfactory results with the simulation, Gestamp successfully industrialized this particularly challenging B-pillar on the Brazilian market. Results achieved were of exceptional value as proven by the high precision observed in the actual formed part.



Plastic strain analysis



Equivalent stress analysis – the influence of thickness is noticeable



Springback before tool compensation



Springback after tool compensation

To find out more about ESI's Sheet Metal Forming Simulation Suite, please visit: www.esi-group.com/products/metal-forming

ABOUT GESTAMP AUTOMOCIÓN

Gestamp Automoción is an international group dedicated to the design, development and manufacturing of metal components and structural systems for the automotive industry. Today, "Gestamp Automoción" is present in 22 countries and has 95 production centers (49 Plants in West Europe, 15 Plants in East Europe, 8 Plants in North America, 14 Plants in Asia, units in Brasil and in Argentina) and 13 R&D Centers, and over 25.000 people. The turnover in 2010 was 3,040 million Euros. Over the last decade, the company have experienced strong growth, thanks to the quality of their employees, who are dedicated to innovation.

ABOUT ESI GROUP

ESI is a pioneer and world-leading provider in virtual prototyping for manufacturing industries that takes into account the physics of materials. ESI has developed an extensive suite of coherent, industry-oriented applications to realistically simulate a product's behavior during testing, to fine-tune manufacturing processes in accordance with desired product performance, and to evaluate the environment's impact on performance. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping, thus eliminating the need for physical prototypes during product development. The company employs about 850 high-level specialists worldwide covering more than 30 countries. ESI Group is listed in compartment C of NYSE Euronext Paris. For further information, visit www.esi-group.com.



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