



Harbin Aircraft Industry Group Co. Ltd successfully implements rubber pad forming simulation using PAM-STAMP 2G

THE CHALLENGE

Perfectly suited for aeronautics applications, rubber pad forming (RPF) enables the production of complex parts with excellent quality and even material distribution.

Harbin Aircraft Industry Group Co. Ltd (HAIG) has acquired top-level experience with its rubber pad forming techniques and processes, yet it seeks further and earlier die design optimization and to improve product quality through simulation.

THE BENEFITS

- 50% time-saving on springback angle definition, compared to the former manual approach,
- The right die design the first time,
- Improved surface quality.

“With PAM-STAMP 2G, we can successfully control the quality of our products. What’s more, both the cost and the time can be decreased by thirty or even fifty percent. It’s become an essential tool for our job.”

Mr. Liu Junji, Vice-CTO of Harbin Aircraft Industry Group Co. Ltd.

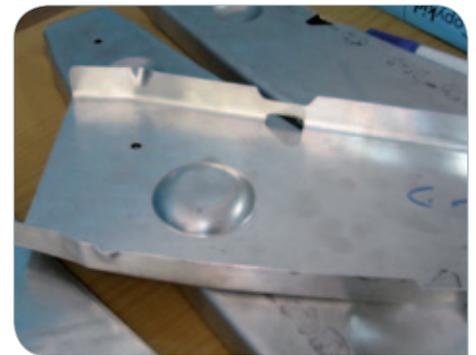
Harbin Aircraft Industry Group Co. Ltd (HAIG) uses rubber pad forming (RPF) to manufacture high precision light weight components for its aircraft. Rubber pad forming consists in applying hydraulic pressure on a rubber membrane in order to press a metal sheet over (or inside) a solid die. Compared to stamping, it enables smoother, more even material deformation and preserves the aspect of the top surface.

As metal sheet properties steadily rise and thicknesses correspondingly shrink, it is becoming increasingly challenging to anticipate springback angles and to avoid wrinkles, thinning and other undesirable effects. HAIG investigated how PAM-STAMP 2G, a complete, scalable and streamlined stamping solution, could assist them throughout the four steps of the value chain:

1. Die design and blank generation,
2. Review of simulation results,
3. Tuning of die and other tools,
4. Die manufacturing and parts production.



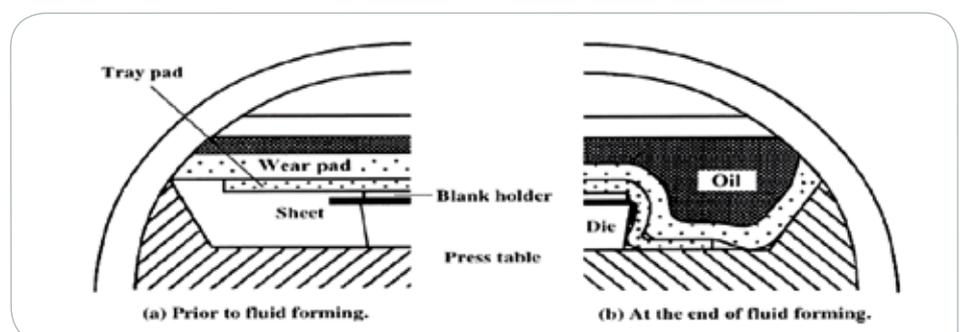
The bracket with wrinkles



The springback angles could be computed with PAM-STAMP 2G

“Several recent projects were completed 2 months earlier than we expected”

Mr. Liu Yanwei, Stamping Engineer of Harbin Aircraft Industry Group Co. Ltd.



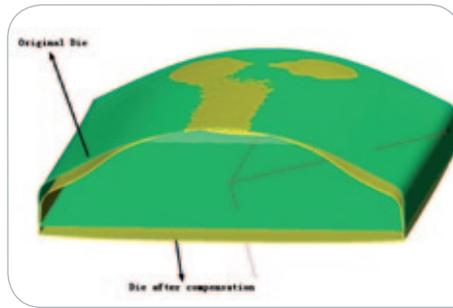
Rubber pad forming principle

In effect, the cycle time for the die design try-out was reduced significantly with simulation as no physical die was actually needed.

For complicated parts, results are available in just a few hours of computation time. Based on the material characteristics, die compensation in PAM-STAMP 2G adapted the original design in order to account for specific springback.

The forming sequence can then be tested for undesirable effects such as wrinkling in bends and corners, comparatively low stretching on broad flat surfaces, or material cracking. This can be used to further optimize die design before any machining occurs.

The finalized design is converted into machining data which can be fed directly to the tool shop in order to manufacture the forming die for testing and validation of the simulation results.



Springback compensation result

The outcome for Harbin Aircraft Industry Group Co. Ltd was less tool tuning time and improved product quality, both in geometry and aspect.

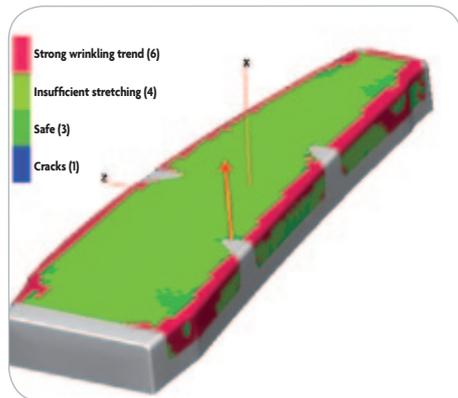
The next phases in the deployment of rubber-pad forming simulation at HAIG will consist in improving internal best practices throughout the several steps of the simulation process, and building and fine-tuning their specific material database, thereby ensuring faster and even more accurate simulation results.

“ PAM-STAMP 2G really offers a new method to control both the forming quality and springback angles. For the latter, all we could do previously was complete the job based on experimental data or our experience.”

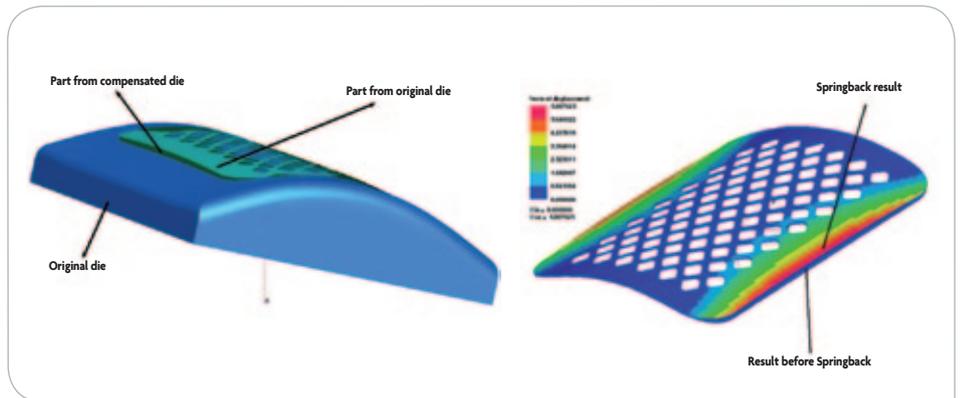
Mr. Liu Junji, Vice-CTO of Harbin Aircraft Industry Group Co. Ltd.



Real process environment of rubber pad forming



Undesirable effects calculation with straightforward visual output



Springback compensation result on die shape (left) and final part (right)

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

ABOUT HARBIN AIRCRAFT INDUSTRY GROUP

It's one of top 5 aircraft companies of AVIC. With more than 50 years' efforts, HAIG has built up multi-families and multi-types of aeronautical products, including Y12 serial light and general-purposed aircraft, H425 serial civil helicopters, Z9 serial military helicopters, HC120 helicopters, the ultra-lights and ERJ145 regional jet airplane through cooperation with EMBRAER Brazil. Now, HAIG has become an important backbone aviation enterprise in China and a component supplier for the worldwide famous aviation enterprises such as Boeing and Airbus, etc. For more information: www.hafei.com

ABOUT ESI GROUP

ESI is a pioneer and world-leading provider in virtual prototyping 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 over 750 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.



ESI Group Headquarters | 100-102 Avenue de Suffren | 75015 Paris | FRANCE | T. +33 (0)1 53 65 14 14 | F. +33 (0)1 53 65 14 12 | info@esi-group.com

All PAM- and SYS- product names as well as other products belonging to ESI's portfolio are tradenames or trademarks of ESI Group, except specified proprietary mention. All other trademarks are the property of their respective owners - Specifications are subject to change without notice.