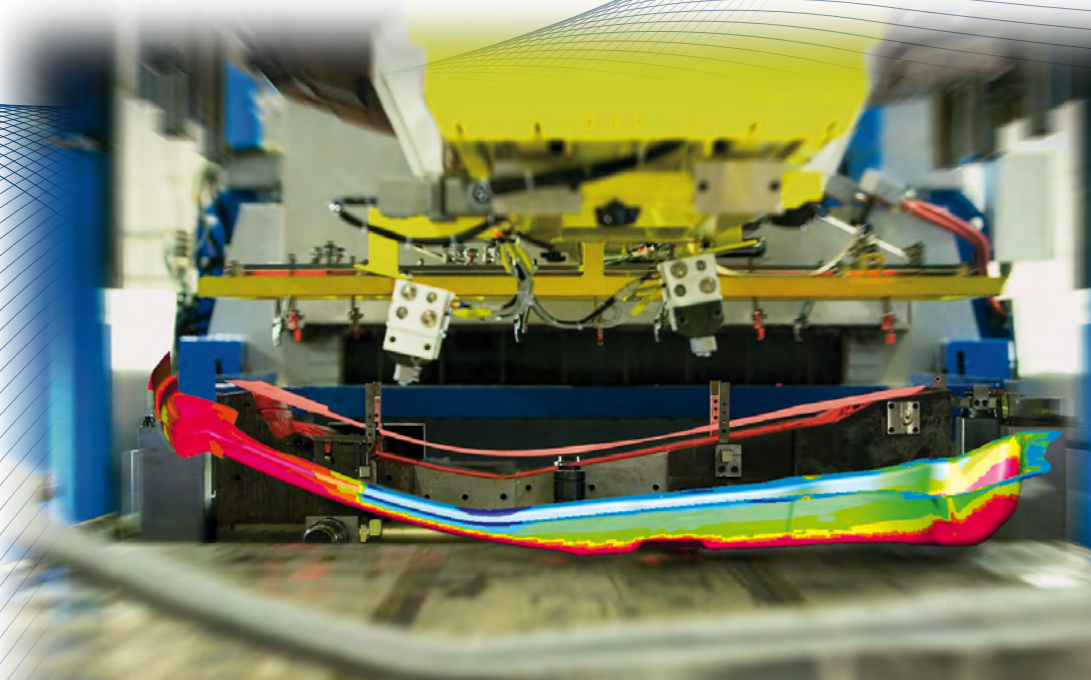


Sheet Metal Forming Simulation Suite

PAM-STAMP 2G



Courtesy of AP&T

Sheet Metal Forming Simulation Suite

A single software suite for all your metal forming needs: PAM-STAMP 2G is a dedicated solution for sheet metal forming, with the appropriate tools adapted to the context of your project.

PAM-STAMP 2G

PAM-STAMP 2G is a complete, integrated, scalable and streamlined stamping solution. It covers the entire tooling process including quotation and die design with formability and try-out validation, springback prediction and correction. It provides solutions-oriented tools for automotive, aerospace, and general stamping processes.

Benefits

- Speeds up part and die design and improves stamping process quality
- Reduces costs, by using die development methods validated by industrial users to deliver dies right the first time
- Masters springback in the manufacturing process and delivers fast and accurate die compensation
- Supports a wide variety of materials; Aluminium, Titanium, Dual Phase, Trip, Boron etc.
- Ensures trouble free manufacturing through virtual tests

Part Feasibility / Cost Estimation

At the beginning of a project, **initial feasibility** is generally assessed based on the component geometry. The 'inverse' solver available in PAM-DIEMAKER for CATIA V5 and in PAM-STAMP 2G estimates the feasibility of the part shape itself. Such an inverse calculation can be performed in a matter of minutes, allowing quick iteration with product designers to improve the part shape for forming.

Cost estimation is generally done at this stage, again with the help of the inverse solver. It provides the flattened blank shape, from which the cost of the raw material can be determined.



Fast Die Design

Produce representative die geometries fast to evaluate different die concepts quickly and easily. Perform interactive die adjustments and modification to rectify any identified forming issues. PAM-DIEMAKER for CATIA V5 is a dedicated solution for rapid die design, offering powerful process oriented functions for each step in the die design process.

Formability Assessment

Formability assessment by simulation is a standard part of all Die Engineering processes today. PAM-STAMP 2G includes a fast solver to make this assessment, offering a choice in the balance between speed and accuracy. Thanks to short simulation times, benefit from fast iterations with the die design, reducing the risk of splits, cracks, and wrinkles in the forming process.

Die Compensation

Die Compensation & CAD Update

PAM-STAMP 2G includes an integrated Automatic Die Compensation module, which modifies the shape of the die in order to correct for the effects of Springback. Once the final die shape is determined, the CAD model needs to be updated using third party software such as PanelShop from iCapp.



FINAL CAD

Quality Control

Springback Calculation

At each stamping step, blank deformation induces internal strains resulting in springback. Springback calculation can be done with PAM-STAMP 2G to show the expected deformation field after the forming and release. Combined with die compensation, this widely used and accepted tool avoids costly re-cuts and program delays.

Process Validation / Virtual Testing

Stamping, flanging, hemming

Once we arrive at the process validation step, without having produced a single physical prototype, when the die is finally machined and finished, it will be 'right the first time'.

Process validation can go further, evaluating process stability and robustness, using simulation to account for real world variability, ensuring that the die will perform in production, not just as a prototype.

Formability Check

Die Design

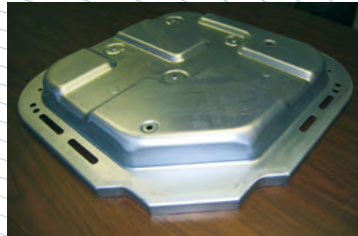
Part Geometry

From quick die design....

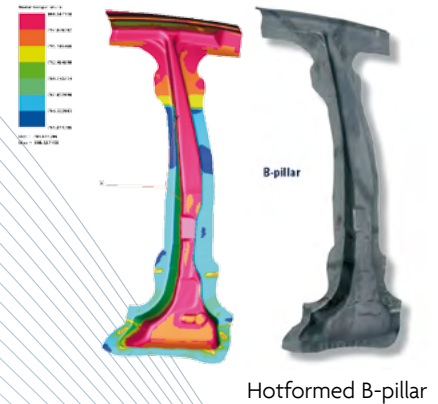
One Simulation Suite for all your Sheet Metal Forming needs

ESI's Sheet Metal Forming Simulation Suite covers all your needs linked to the simulation of different metal forming processes. PAM-STAMP 2G simulates not only the full stamping chain, but also processes such as:

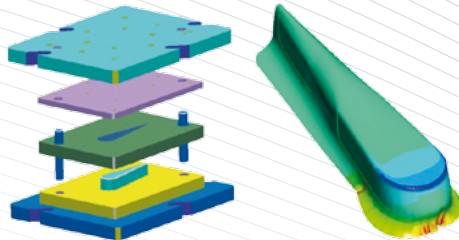
- Hotforming
- Stretch forming
- Superplastic forming
- Rubber pad forming
- Tube forming
- Rollhemming
- Progressive die
- etc



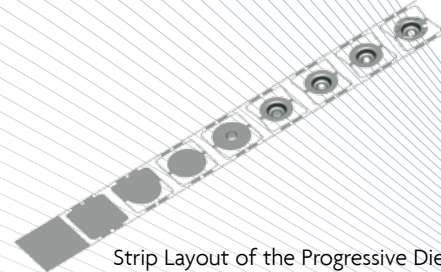
Physical part obtained right the first time based on simulation work
Courtesy: Doerfer Companies



Hotformed B-pillar



Flexforming simulation



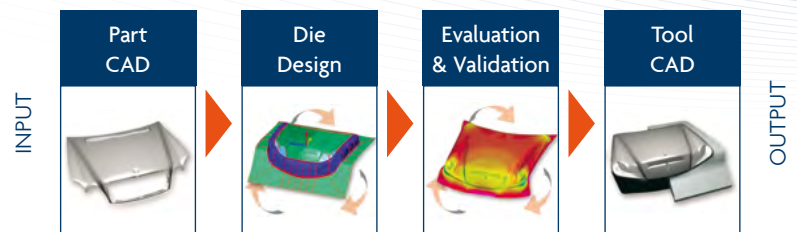
Strip Layout of the Progressive Die

Special customizable macros can be built to fit your exact application, ensuring a smooth workflow and ease of use.

Save design time with link to PAM-DIEMAKER for CATIA V5



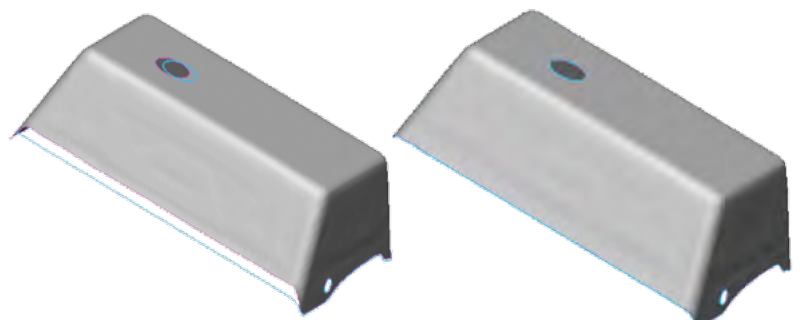
With the link to PAM-DIEMAKER for CATIA V5, the whole chain can be covered inside CATIA and remain CAD-based throughout the design process, from the input part CAD geometry to the final tool CAD design. This allows significant time saving, whilst ensuring the high quality of the results.



Optimization

PAM-STAMP 2G includes optimization modules for trim line and blank line optimization. More generic optimization of stamping process parameters, such as forces and drawbeads, becomes more accessible today as computer hardware technology develops.

Optimization and robustness assessments are becoming a logical extension of forming simulation.



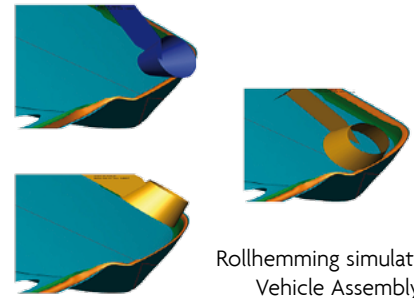
Before and after trim line optimization

PSA PEUGEOT CITROËN use PAM-STAMP 2G for Successful Rollhemming Simulation on Vehicle Assembly Lines



"The most significant state-of-the-art physical parameters identified by PSA's hemming specialists were integrated into PAM-STAMP 2G. Validated through real-life industrial cases, this new tool has quickly become essential to guarantee successful product definition and process reliability."

Patrice Auger, R&D Manager for Assembly Processes PSA-Peugeot-Citroën



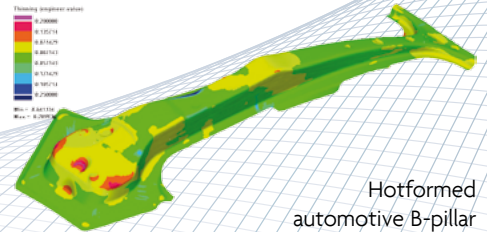
Rollhemming simulation on Vehicle Assembly Lines

Tecnalia-Labein successfully use PAM-STAMP 2G to optimize the process design of an industrial hotformed part



"PAM-STAMP 2G has enabled a fast design of the hotforming tooling, and due to the high level of accuracy of the results, it has allowed the validation of the tooling and simulation results with the experimental tests."

Iñigo Aranguren /Marian Gutiérrez, Automotive Unit, Tecnalia-Labein



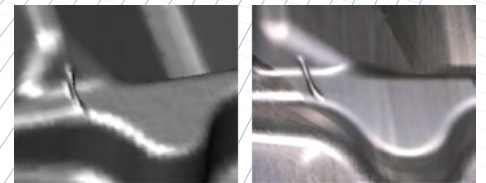
Hotformed automotive B-pillar

Superform USA relies on PAM-STAMP 2G to iteratively design complex tools and prove feasibility virtually



"PAM-STAMP 2G has transformed the speed with which we can develop thickness predictions and forming cycles. While we deploy our intuition, experience and creativity to design the tools, PAM-STAMP 2G lets us test the feasibility of our ideas without cutting metal."

A.J. Barnes, Technical Vice President of Superform USA



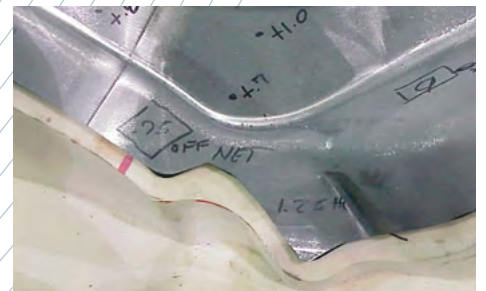
Remarkable correlation between simulated and actual wrinkle

Atlas Tool, Inc. stamps outs Springback with PAM-STAMP 2G



"Advanced high-strength steels and particularly dual-phase steels are being utilized more and more by OEMs to improve safety, reduce weight and lower cost. The use of an advanced incremental simulation tool enables us to overcome the formability challenges posed by these materials and meet our customers' requirements in as little time as possible. We believe our expertise with PAM-STAMP 2G is a significant competitive advantage."

Mark R. Schmidt, Atlas Tool's President



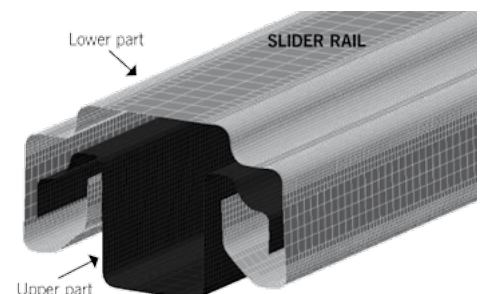
First part on gauge dimensions

With PAM-STAMP 2G, FAURECIA reduces the tooling time to design seat components by 20%.



"Thanks to PAM-STAMP 2G, we have been able to predict with accuracy the stamping process of slider rails and flange. We've used it to predict and manage the thickness distribution, stress, strain and cracks apparition during forming and distortion after springback. Simulation results being identical to the real parts, PAM-STAMP 2G helped us modify tool design and achieve high quality for die tooling and seat components."

Vincent Retaillaud, Tracks Product Line Bending Process manufacturing Engineering Manager, Faurecia



**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

EUROPE

**BENELUX
& SCANDINAVIA**

ESI Group Netherlands
Radex Innovation Centre
room 4.57
Rotterdamseweg 183 C
2629 HD Delft
The Netherlands
T. +31 (0)15 2682501
F. +31 (0)15 2682514

**CZECH REPUBLIC
& EASTERN
EUROPE**

MECAS ESI
Brojova 2113/16
326 00 Pilsen
Czech Republic
T. +420 377 432 931
F. +420 377 432 930

FRANCE

**ESI France
Headquarters**
Parc d'Affaires Silic
99, rue des Solets - BP 80112
94513 Rungis Cedex - France
T. +33 (0)1 49 78 28 00
F. +33 (0)1 46 87 72 02

ESI France
Le Récamier
70, rue Robert
69458 Lyon Cedex 06
France
T. +33 (0)4 78 14 12 00
F. +33 (0)4 78 14 12 01

SPAIN

**ESI Group Hispania
Headquarters**
Parque Empresarial Arroyo
de la Vega
C/ Francisca Delgado, 11.
Planta 3ª - 28108 Alcobendas
Madrid - Spain
T. +34 91 484 02 56
F. +34 91 484 02 55

ESI Group Hispania, S.L.
C/ Balmes, 188
Oficinas B188
08006 - Barcelona
Spain
T. +34 93 152 10 25
F. +34 93 218 01 01

GERMANY

**ESI GmbH
Headquarters**
Siemensstr. 12
63263 Neu-Isenburg
Germany
T. +49 6102 2067 - 0
F. +49 6102 2067 - 111

ESI GmbH
Einsteinring 24 - Haus 4
85609 München-Dornach
Germany
T. +49 89 45 10 888 0
F. +49 89 45 10 888 18

ESI GmbH
Kruppstr. 82-100 / ETEC
V5-105
45145 Essen
Germany
T. +49 (0)201 125 072 0
F. +49 (0)201 125 072 24

ESI GmbH
Jurastr. 8,
70565 Stuttgart
Germany
T. +49 (0) 711 27 303 0
F. +49 (0) 711 27 303 110

ITALY

ESI Italia
Via San Donato 191
40127 Bologna
Italy
T. +39 0516335577
T. +39 0516335578
F. +39 0516335601

SWEDEN

Efield ESI
Sjöängsvägen 15
SE-192 72 Sollentuna
Sweden
T. +46 8 410 03 511
M. +46 70 999 18 71

SWITZERLAND

Calcom ESI
Parc Scientifique EPFL /
PSE-A
CH-1015 Lausanne
Switzerland
T. +41 21 693 2918
F. +41 21 693 4740

UNITED KINGDOM

ESI UK
16 Morston Court,
Kingswood Lakeside,
Cannock, WS11 8JB
United Kingdom
T. +44 (0) 1543397900
F. +44 (0) 1543504898

ASIA

CHINA

ESI China
Unit 1006-1008,
Metropolis Tower
No. 2 Haidiandongsanjie,
Haidian District,
Beijing, 100080 - China
T. +86 (10)-65544907/8/9
F. +86 (10)-65544911

INDIA

**ESI India
Headquarters**
No. 24-25, Ground floor
27th Cross Banashankri
2nd stage
Bangalore 560 070
India
T. +91 80 4017 4747
F. +91 80 4017 4705

ESI MW India
502, Pentagon 2,
Magarpatta City
Pune - 411 013
Maharashtra
India
T. +91-20-26898
172/173/175/229
F. +91-20-26898 239

JAPAN

**ESI Japan
Headquarters**
15F and 16F Shinjuku Green
Tower Bldg, 6-14-1,
Nishi-Shinjuku
Shinjuku-ku, Tokyo 160-0023
Japan
T. +81 3 6381 8490 / 8494
F. +81 3 6381 8488 / 8489

**ESI Japan
Kansai Branch Office**
Nishi-Nihon Sales office
5F Advance Esaka Bldg,
8-10 Toyotsu-cho
Suita-shi,
Osaka 564-0051
Japan
T. +81 6 6330 2720
F. +81 6 6330 2740

**ESI Japan
Chubu Branch Office**
9F Daisan Horuchi Bldg,
4-6-23, Meieki
Nakamura-ku, Nagoya-shi,
Aichi 450-0002
Japan
T. +81 52 589 7100
F. +81 52 589 7001

RUSSIA

ESI Russia
Vainera str. 51b, 3rd floor
620014, Yekaterinburg
Russian Federation
C. +7 919 361 14 80
T./F. +7 343 311 02 33

SOUTH-EAST ASIA

**ESI Group
South-East Asia**
ROAP Office
N° 20-2 (2nd floor)
Jalan Metro Pudu
Fraser Business Park
55100 Kuala Lumpur,
Malaysia
T. +6012 618 1014

SOUTH KOREA

Hankook ESI
4F Ryuhans B/D, 134-1
Gayang-dong, Gangseo-gu
Seoul 157-801
South Korea
T. +82 2 3660 4500
F. +82 2 3662 0084

AMERICAS

USA

**ESI North America
Headquarters**
32605 W 12 Mile Road,
Suite 350,
Farmington Hills,
MI 48334-3379
USA
T. +1 (248) 381-8040
F. +1 (248) 381-8998

ESI North America
12555 High Bluff Drive
Suite 250
San Diego, CA 92130
USA
T. +1 (858) 350 0057
F. +1 (858) 350 8328

ESI North America
2880 Zanker Road
Suite 105
San Jose, CA 95134
USA
T. +1 (408) 824 1212
F. +1 (408) 824 1216

ESI North America
6767 Old Madison Pike
Suite 600
Huntsville, AL 35806
USA
T. +1 (256) 713-4700
F. +1 (256) 713-4799

SOUTH AMERICA

ESI South America
Av. Pedrosa de Moraes,
1619 cj.312
São Paulo
SP CEP 05419-001
Brazil
T./F. +55 (011) 3031-6221



info@esi-group.com



ABOUT ESI GROUP

ESI is a pioneer and world-leading provider in Virtual Prototyping that takes into account the physics of materials. ESI boasts a unique know-how in Virtual Product Engineering, based on an integrated suite of coherent, industry-oriented applications. Addressing manufacturing industries, Virtual Product Engineering aims to replace physical prototypes by realistically simulating a product's behavior during testing, to fine-tune fabrication and assembly processes in accordance with desired product performance, and to evaluate the impact of product use under normal or accidental conditions. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping. These solutions are delivered using the latest technologies, including immersive Virtual Reality, to bring products to life in 3D; helping customers make the right decisions throughout product development. The company employs about 950 high-level specialists worldwide covering more than 30 countries. ESI Group is listed in compartment C of NYSE Euronext Paris.