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Sheet Metal Forming Simulation Solutions

THE DIGITAL PRESS: TRYOUT BEFORE TOOLING

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BSE - Blank Size Engineering

The Blank Size Engineering module can reversely calculate the blank shape and 3D trimming line of stamping parts accurately, optimize the nesting layout and calculate the material utilization and cost intelligently, and simultaneously evaluate the formability of the stamping parts.

DFD - Die Face Design

The Die Face Design module provides abundant tools for fast die surface design, including the binder design, addendum design and so on It can be used to complete the design in the die quotation stage without special CAD software.

FS - Formability Simulation

The Formability Simulation module is used for the simulation analysis of the whole process of stamping, which accurately predicts the process problems in the die trial process, such as cracking, wrinkling and springback, shortens the die development cycle, and reduces the number of die trial and production costs.

BTD - Blank Trim Line Development

The Blank &Trim Line Development module can automatically correct the original blank outline and optimize the trim line to obtain the accurate initial blank outline and trimming line.

TBF - Tube Bending & Forming

The Tube Forming module provides a complete set of solutions for tube bending and hydroforming analysis, which supports users to complete the processes from product import to analysis results.

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Principal Business:

- Software Development and Sales Service.
- Engage in Simultaneous Engineering (dimension engineering, CAE analysis and other engineering and technical consulting services.
- Provide technical services for testing material properties.
- Provide high performance computing.

Company Profile

Engineering Technology Associates Inc (founded in 1983 and headquartered in Troy, USA is an engineering company dedicated to the development of CAE software used in automotive, aerospace, electronics, mold, national defense and military industry, and 3C products and other fields, and provides technical services. ETA has more than 300 high quality professionals around the world to provide comprehensive technical service to customers. ETA's software products facilitate companies to save time, reduce costs and create wealth in the process of product design, manufacturing and testing.

ETA has accumulated great experience in engineering and developed new analysis methods and CAE software with over 30 years of cooperation with the BIG 3 automotive companies (General Motors Corp., Ford Motors Corp. and Chrysler Corp.) and long-term cooperation with other leading international automotive companies, modeling companies, universities and research institutions. ETA's software products help enterprises save time, reduce costs and create wealth during the product design, manufacturing and testing. ETA has become one of the outstanding engineering technology service providers in the global CAE industry.

Some of Our Customers NISSAN gп S MARUTI SUZUKI MOTOR CORPORATION FCA HYUNDAI YAZAKI **Use Content of Conten** STEEL HONDA BENTELER 🕅 Honda R&D makes it happen Gestamp 🖉 PATAC *BRIDGESTORE* **MITSUMI** STELLANTIS American Pan EUROPE thyssenkrupp FOTILE CLIFFS Midea® **Arcelor**Mittal

About

Dynaform specializes in the sheet metal simulation solutions that quickly evaluate the product formability and estimate the mould and material costs. It facilitates the user to accurately simulate and predict the forming problems occurred in the process of parts stamping, verify the reliability of the product and die design, shorten the development cycle and reduce the development cost.

Blank Size Engineering

Blank Size Engineering (is used to generate the blank outline, estimate product trimming line and nesting blank layout. It is equipped with the modified one step code, MSTEP for the rapid stamping simulation. The user may generate quick formability report for the product after conducting BSE simulation. MSTEP is improved to estimate sheet forming feasibility during the part design and development cycle, while which allows the user to quickly and accurately predict the blank size. The BSE enables users to quickly estimate the trim line of complicated parts. The improved blank nesting function optimizes the nesting result. For nesting of complicated parts, the result yields higher material utilization rate and more practical nesting layout.

Unfold & Feasibility

- Reversely calculate the blank shape of the stamping parts fast and accurately. Support the single parts, Symmetry/double attached, tailor welded parts and patch work. Support to define the tools and constraint boundary conditions when unfolding the parts.
- Evaluate the formability of the stamping parts rapidly. Support to generate the formability analysis reports with one click, including the thinning rate, stress strain, thickness, FLD contour, etc. to guide the process design and avoid invalid design.
- Support two Unfold Modes: Simple and Advanced, and the Wizard mode guides users to perform the operations easily.



Unfold Trim Line

- The process features are expanded to the surface of drawing die to accurately obtain the 3 D outline of the trimming line after the parts are quickly calculated, saving the process for the user to calculate the trimming line in CAD software.
- Further optimize the trimming line automatically with the incremental method to effectively reduce the number of actual debugging.



Nesting

- Support the Coil, Plate and Progressive blank types, and one up nesting, two up nesting, two pair nesting and multi blanks nesting types. It can be used to add constraints to the original blank, extend the boundary of the outline and edit the predefined shape.
- Support to manually adjust the nesting results and create the 3D trimming line, support the re-layout in the hole of the outline to improve the material utilization and support the multiple rows layout during the Coil nesting, etc.
- Support the generation of nesting reports. Define the information about the material price, and the program automatically calculates the material utilization rate and the material cost output nesting report to quickly quote the products.



Assembly BSE

- It supports the user to import multiple model files or assembly files to quickly obtain the accurate estimation of product formability and blank outline and the nesting results in batch. Finally, the program will automatically write the model information and nesting results in the specified Excel template, which greatly saves the users' operation time.
- This function can be applied to the Dynaform environment or the Team Center platform to read files from the BOM table under the Team Center platform, analyze all parts in batches, and output the results to the BOM table automatically.



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Die Face Design

The Die Face Design (DFD) module provides a comprehensive suite of tools for rapidly creating Line Die Layouts in multistage design. These tools encompass Die Face creation, Forming Tool Design, Trimming, Flanging Tool Design, as well as the ability to modify the binder and addendum, make local feature adjustments, and conduct efficient evaluations of the multistage setup. Users have the flexibility to adjust the binder, addendum, and other tools based on the evaluation results, resulting in a significant enhancement of Die Face design optimization efficiency.

DFD guides users through the multistage design process, starting from the import of the digital product model and following the actual die design process. Once the multistage design is complete, users can perform quick evaluations using LS-Dyna or SigForm solver. In cases where the designed die face falls short of requirements, users can promptly modify the tools and resubmit for analysis. Die Face Design eliminates the need for specialized CAD software during the die quotation stage.

Part Preparation

After the user imports the product digital model, the function supports to preprocess and modify the model surface, such as the symmetry, inner hole, boundary and end of the part definition according to the features of the parts.

- **Part Symmetry Type:** Support various part symmetry types. Meet the requirements of forming process design for different parts.
- Inner Fill: Automatically identify the inner hole. Inner fill for single piece and automatic fill for multiple holes. Hole fill with cross symmetric surface. Support to add the control line inside the hole.
- Boundary Smooth: Automatically and manually smooth the outer boundary. Automatically smooth the other side of the symmetric part. Support the boundary smooth with cross symmetric surface. Support multiple smoothing.
- **Double Fill:** Automatically identify the double fill boundary. Automatically create the feature profiles. Support to manually add the profile. Support to adjust the position of the boundary points.
- End Fill: Automatically create the profile. Support to adjust the shape of each profile. Support the creation with cross symmetric surface.



Binder Design

The binder includes the flat binder, conical binder and the manually imported outer binder. Add the control line of the binder and adjust the shape of the control line to conform the binder to the characteristics of parts.

- Support the creation of the control to modify the binder shape.
- Support the real time update of symmetrical binder.
- Support the rapid generation of the shape follow up binder.
- Support to import the binder externally.
- Adjust the shape of control line in 2D window, and display the binder shape in 3D graphic area in real time.
- Automatically create the control line of symmetrical parts, and adjust the control line simultaneously.



Addendum Design

Various profile templates and corresponding parameters can help users accurately adjust the shape of local profile. Users can adjust the shape parameters of profiles in 3D view, and smooth transition between different main profiles can be achieved with the automatic transition optimization algorithm.

- Create the external and internal addendum.
- The profile includes three parts: Flange, CBar and Bar.
- Support to define the whole circle along the part boundary, or define in segments.
- Support to export the generated binder and addendum.
- Support to adjust the shape of the control profile with the automatic transition of the profile shape between the control profile.





Die Face Analysis

After the die face design is completed, the program automatically generates a tool for forming analysis to define the blank shape as well as the material and thickness, and quickly evaluate the designed die face using the built in fast solver One Step, SigForm or LS DYNA.

- Built in fast solver.
- Evaluate the feasibility of die face design.

Formability Simulation

The Formability Simulation module (provides a complete set of solutions for sheet forming Various blank types provide rapid methods for the user to generate the blank. It supports the definition for tailor welded blank, laminated blank, rolled blank and patchwork blank, which provides abundant material library. The default process parameters make it easier for the user to complete the settings for the practical technology. The user only needs to simply define the material and process parameter for the analysis and calculation, which greatly simplifies the setting process for the analysis.

Multistage Simulation

It adopts the famous and powerful LS DYNA solver in the industry with tens of thousands of stamping simulation experience, which accurately simulates all kinds of sheet metal forming problems for areas such as drawing, trimming, flanging as well as springback and springback compensation simulation in the stamping forming.



Progressive Die Simulation

It supports the stamping simulation of the progressive die parts and gradually forms the final product shape after several stamping.

Tailor Welded Blank Simulation

It supports to define different blank types such as tailor welded blank, laminated blank, rolled blank and patchwork blank.





Springback & Springback Compensation

After the part is formed, the user can carry out the springback and springback compensation simulation.



Solid Blank Simulation

When considering the influences of material anisotropy and the sheet thickness changes on the model, the sheet body element analysis is supported.



Sheet Blank Hydroforming Simulation

It supports the hydroforming without punch and with punch for the blank, and the user can define the loading curve for hydraulic pressure.



Wrinkle & Crack Prediction

It accurately predicts the process problems in the mold trial process, such as tearing, wrinkling and springback, shortens the mold development cycle, reduces the number of mold trial and production costs, and thereby improves the competitiveness of the enterprise.



Result Evaluation

This application can be used to fast process the post processing results of sheet forming simulation, including real time animation of FLD, stress and strain, thickness thinning rate, etc.



Hot Forming

Three stages are included in the Hot Forming module (HF):

Gravity Loading, Hot Forming and Hardening It allows the user to delete Gravity and Hardening stages except the Hot Forming stage, and users can also add the trimming and cooling stages.



Blank & Trim Line Development

The Blank Trim Line Development module (BTD) uses an iterative approach to develop a Blank or Trim Line. In the iterative process, it automatically corrects the original blank outline and trimming line and then substitute the corrected result into the recalculation, matching the final formed results with the defined product target line, so as to obtain the accurate initial blank outline and trimming line.



Optimization

The Optimization module (OP) is mainly used to optimize the binder hold force and line bead force. A "Black Box" solution is built with a set of simple dialog Box Users only need to define the parameters and optimized objects, and the system will automatically calculate an optimized reasonable parameter value, allowing users to view the optimized parameter results.



Tube Bending & Forming

Tube Forming (TF) provides a complete set of solutions for tube bending and hydroforming analysis. This module supports users to complete the processes from product import to analysis results, including Tube Bending, Pre forming, Annealing, Hydroforming, Piercing and Trimming and other processes

Tube Multistage Simulation

Support users to complete the processes from product import to analysis results.



Tube Multistage Bending

Automatically create the bending tools and tube with full parameterization and assembly positioning with integrated solving.



Tube Hydroforming

The hydroforming is controlled by Pressure or Volume.



Drop Test

The Drop Test module (is utilized to analyze the part deformation in the shedding and transferring process.





Die System Analysis

The Die System Analysis module (DSA) consists of Die Structural Integrity (DSI), Scrap Shedding Removal (SSR) and Sheet Metal Transfer Handling (SMTH) which is an efficient way to predict and resolve many stamping related concerns within the die production line.



Report

The ETA Report application is utilized to automatically generate relevant CAE analysis reports, supporting both PowerPoint and Excel modes. In this module, simulation results can be automatically updated from different iterations. Plots and list tables can be automatically updated Plots of local area can be manually updated if necessary.

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