AutoForm TubeXpert

Software Solution for Rapid Tool Design and Simulation of Tube Bending, Forming, and Hydroforming Processes

- Rapid tool and process design for tubular parts
- Verification of multiple alternative manufacturing concepts for quality and cost improvements
- In-depth understanding of entire forming process for tubular parts
- Shorter development time and reduced tooling, material, and production costs
- Improved process reliability for robust manufacturing

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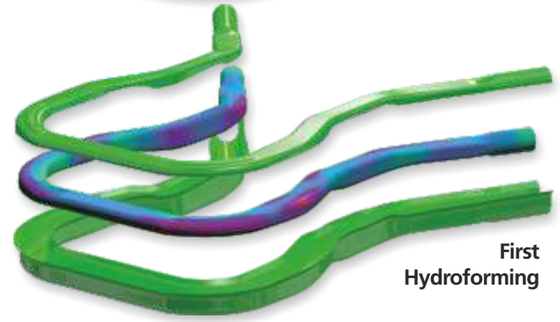
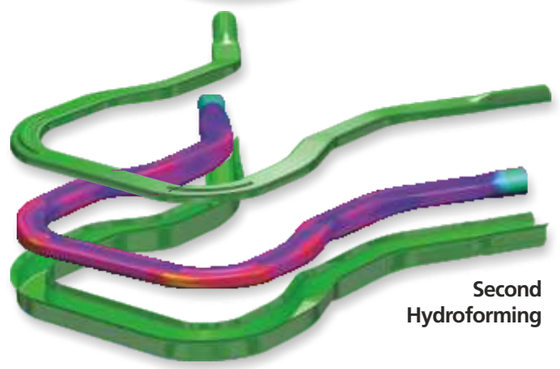
AutoForm TubeXpert

The Highly Intuitive All-in-One Software Solution for Tube Experts

With the AutoForm TubeXpert software solution, users can carry out a complete virtual tryout of the entire hydroforming process, which includes bending, preforming, hydroforming, annealing, calibration, cutting, springback, systematic process improvement and process robustness as well as springback compensation. This software solution is used by part designers, process engineers as well as tool and die makers to evaluate tool designs and process layouts.

Starting from the initial part geometry, AutoForm TubeXpert allows users to rapidly generate all necessary tool geometries as well as to simulate and evaluate the complete forming process of tubular parts. The software solution provides a comprehensive in-depth understanding of bending, forming, and hydroforming processes and allows for the systematic identification of tool design and process improvement potentials. In addition, cold and hot forming processes can be analyzed.





CNC and Bending
AutoForm TubeXpert enables users to automatically determine the center and bending line of the tube. This software offers the necessary bending operations and bending radii, which can be adjusted according to company specifications. AutoForm TubeXpert simulates the bending operations while taking into account all of the necessary bending tool geometries, such as bend die, clamp die, mandrel, etc., and process steps. Forming issues, such as splits, excessive thinning, wrinkles, and distortions, can be easily identified and countermeasures, such as springback compensation, can be applied.

Preforming
Complex part geometries may require additional forming operations before the hydroforming operations are carried out. AutoForm TubeXpert enables the rapid generation of tool designs for preforming operations. The preforming process step can be specified with or without inner pressure and process layout alternatives can be evaluated regarding formability issues.

Hydroforming
AutoForm TubeExpert enables the generation of tool geometries for both the final and intermediate hydroforming steps. The process setup allows users to control the hydroforming process by pressure, displacement or volume. The high flexibility of the process setup enables alternative

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hydroforming process by pressure, displacement or volume. The high flexibility of the process setup enables alternative process validations, such as high, multistep high, and (low) multi pressure hydroforming. Based on the simulation results, users can gain valuable insights regarding the entire tube hydroforming process. The quality of the simulation results is further improved through TriboForm friction functionalities.

Annealing
Additional process steps, such as annealing, are required for certain complex hydroformed parts. Through the annealing process, strains which result from prior operations are eliminated. With AutoForm TubeXpert, annealing can be carried out after any forming process step and results can be evaluated accordingly.

Cutting
AutoForm TubeXpert supports the cutting process steps for tube ends as well as hole piercing. As a result, tube length and the related material costs can be optimized.

Springback
With the increasing usage of high strength materials as well as aluminum alloys, springback analysis is gaining in

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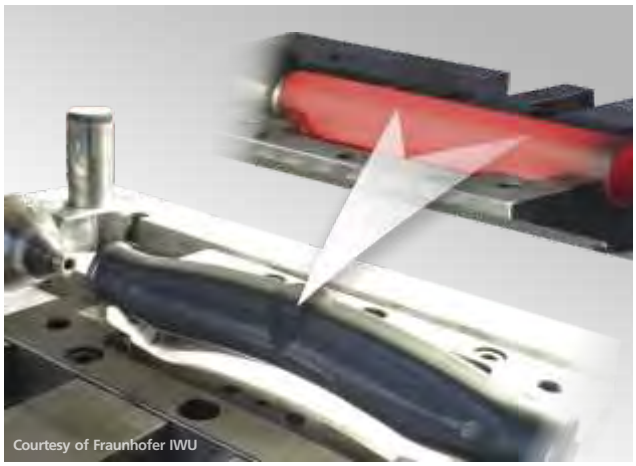
Full Support of Hot Tube Forming Processes

AutoForm TubeXpert enables users to simulate hot tube forming processes, including die face design, temperature and pressure control, applying advanced friction, optimization, and process robustness.

Hot formed tubular parts are manufactured by heating a preformed or straight tube, often forming it with interior gas pressure, and then optionally quenching the part. In the case of manganese-boron steels, this process leads to extreme tensile strengths comparable to hot stamping. This rather new technology, now also available in AutoForm TubeXpert, allows the support of both direct and indirect hot tube forming processes.

The enriched material library includes aluminum, stainless steels, manganese-boron steels as well as titanium alloys applicable for hot forming processes. AutoForm TubeXpert's systematic process improvement and process robustness are also available for application during the hot tube forming process. The software supports advanced friction modeling with TriboForm.


Courtesy of Fraunhofer IWU

Flexible Process Design for Expansion Joints, Bellows, and Tube End Forming

AutoForm TubeXpert allows for flexible process designs, which are essential for expansion joints, bellows, and tube end forming. With AutoForm TubeXpert, users can quickly set up all relevant parameters necessary for such process designs.


Courtesy of Transfluid GmbH

Expansion joints consist of one or several bellows that are manufactured by tube hydroforming before subsequent operations, especially the bending operation. This requires a flexible process design including die face generation and process optimization in order to efficiently reduce the number of tryout loops.

The modeling of tube end forming processes with AutoForm TubeXpert leads to maximum accuracy and the prediction of splits, wrinkles as well as plane tube ends. With AutoForm TubeXpert, process engineers are equipped with an easy-to-use software which allows them to quickly analyze all relevant parameters necessary for flexible process designs.

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