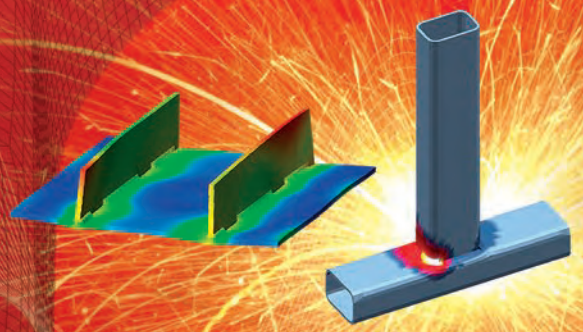
simufact.welding

Professional Welding Simulation



best welded

Arc Welding

Metal Inert Gas Welding (MIG)

Metal Active Gas Welding (MAG)

Laser Welding

Electron Beam Welding (EBW)

simufact

Simulating Manufacturing

MSC Software Company

Industrial welding processes today require a high degree of process reliability. A precise development of welding schedule, necessary for the programming of welding robots, is most important for the process quality. In addition to it, the correct use of fastening devices, the applied welding method and the energy input must also be considered. In order to start serial production of components which meet the tolerances, distortions of the final geometry have to be absolutely controlled. Knowledge about the characteristics of the heat affected zone allows the specialist to draw conclusions on the properties of welding seams.

Transfer of Trials into the Computer

Arc Welding
Metal Inert Gas Welding (MIG)
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Welding Technology in Competition

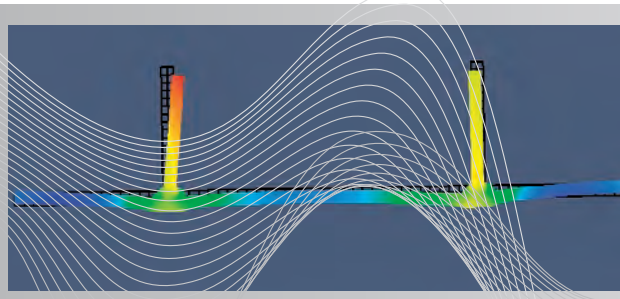
Nowadays, the welding technology ready for serial production can only be ensured by cost and resource intensive tests. However, this approach is critical when planning series construction lines, where the single resources have to be fixed before the final components are known. The present and future challenges demand something different:
Components and component groups are becoming more and more complex, development time is getting shorter, tolerances are getting closer and the speed of production cycles is increasing. Regarding modern high-strength materials, requirements are also intensifying.

What you need and what Simufact.welding offers

Increasing demands on industrial welding processes make process reliability essential. The use of our simulation software enables you to transfer expensive trials into the computer. Simufact.welding is user-friendly so that the virtual process design can be used close to production in order to optimize the real welding processes.

Our simulation software includes

- accurately timed control of several robots
- quick evaluation of variants by changing process parameters
- easy modification of welding sequences, speeds, heat input, stop times and fastening devices
- precise optimization of fusion zones, heat affected zones, tensions and distortions
- intuitive control and supervision of the process by fabrication-specific user interface



... get process reliability by the use of simulation

Your benefit using Simufact.welding will be enormous

- significant increase of productivity through improved process reliability
- considerable savings in development
- reduction of “time-to-market” by radical time savings in process design
- consistent optimization of running serial processes

Process simulation is a factor of competition!

Simufact.welding supports the welding engineer in process design.

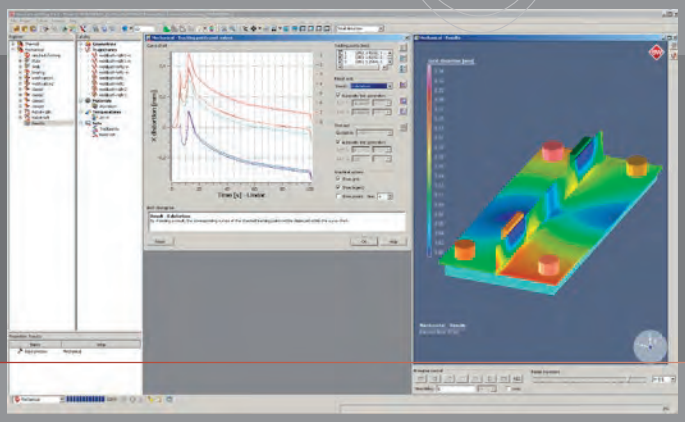
The advantages are obvious:

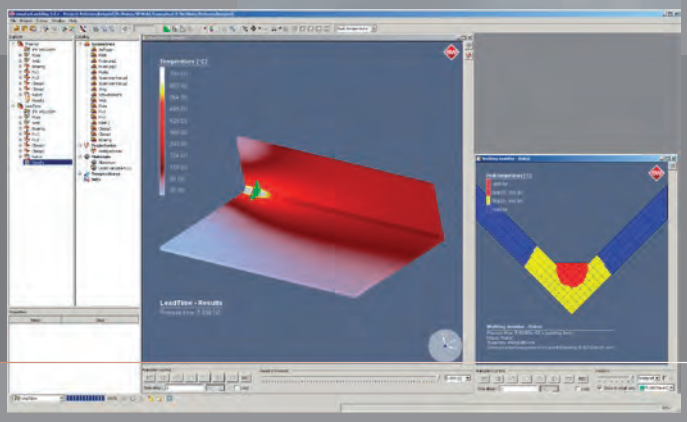
- less time-wasting and cost-intensive trial weldings
- before installing the real production line, you can analyze how many robots you need for a process and in what sequence they must be used
- the influence of energy input can be examined systematically
- even actual production processes can still be optimized

The use of Simufact.welding guarantees a significant increase of process reliability and a dramatic reduction of costs for development and actual production.

Easy Handling and Improved Product Quality –

a Contradiction?





Our top ambition is a program most simple to handle

Welding simulation has so far been considered to be in the domain of research institutes and calculation departments. Practical results and the required high quality made molding and evaluation necessary to an extent which could only be guaranteed by calculation specialists.

Simufact.welding allows the welding expert to operate even without previous knowledge of process simulation due to its intuitive Windows user interface. The user interface is characterized by a precise tree structure of processes and objects to serve as a well-structured display. Regular functions like “drag and drop” which support a fast and reliable model design also feature the user interface. As a matter of course, extensive plausibility control, utilization of predefined libraries as well as assistants for model design and analysis are part of Simufact.welding.

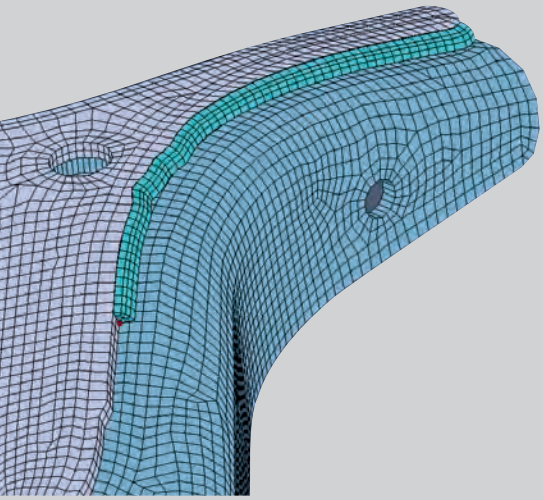
Simufact.welding completely releases the user from time-consuming parameter input as it is necessary for complex analyses. He can fully give his attention to the welding process. The graphically interactive surface helps the user to control robots and fastening devices.

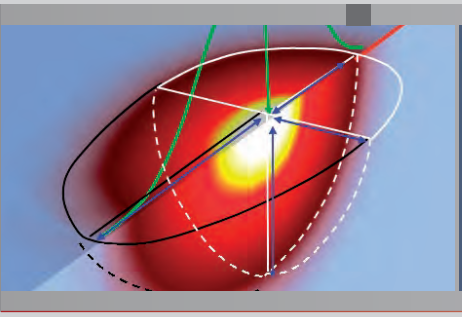
Following evaluation tools are disposable:

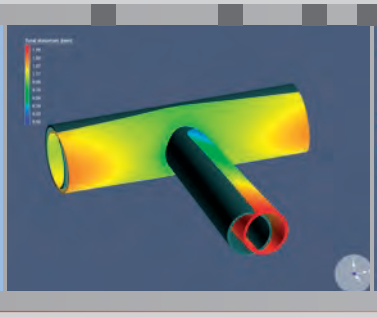
- distortions shown in sections, for the complete component, scaled in any order
- temperatures, residual stress, curve progressions on fixed measuring points for comparison with trial data
- export interfaces and many more

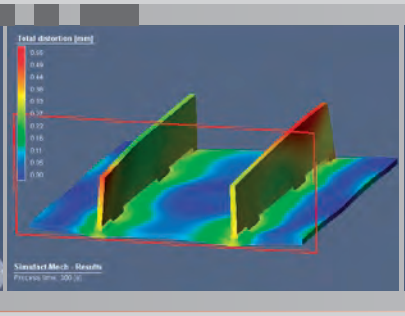
Overview of functionalities

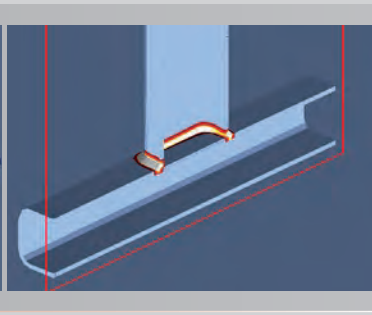
- pre- and post-processing in one GUI
- no data conversion
- fast presentation of results
- result evaluation simultaneously to computation
- interactive graphical sequence control of robots and clamping tools
- section views for all result values
- Weldmonitor (trip to all welding seams in a 2D section)
- measuring point diagrams for comparison with test weldings
- progress indication of calculations with access to already calculated results during the analysis
- context support for all input areas
- interface to RoboCad as well as export interface to robots











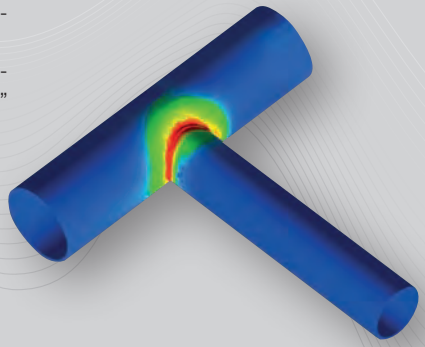
A qualified result is the basic requirement

Quality means that results like distortion, residual stress and formation of the heat affected zone do comply with reality. This can only be achieved by means of transient, mechanical-thermal analyses. We ensure this by the integration of high-performance solvers, which have proved their worth on the market for decades, and furthermore have been optimized by us for welding simulation purposes.

Approved “State of the Art” material patterns, which can consider elastic material behavior as well as plasticity, guarantee a precise calculation of residual stress and thus a prognosis of distortion close to reality.

Also, the definition of exact heat input is decisive for result quality. A unique “Weldmonitor” supports this procedure by comparing the simulated welding seam with microsections from production and calibrating heat source parameters. This happens through very fast and purely thermal pre-analyses and ensures the correct model heat source.

Easy handling does not impact the result quality.

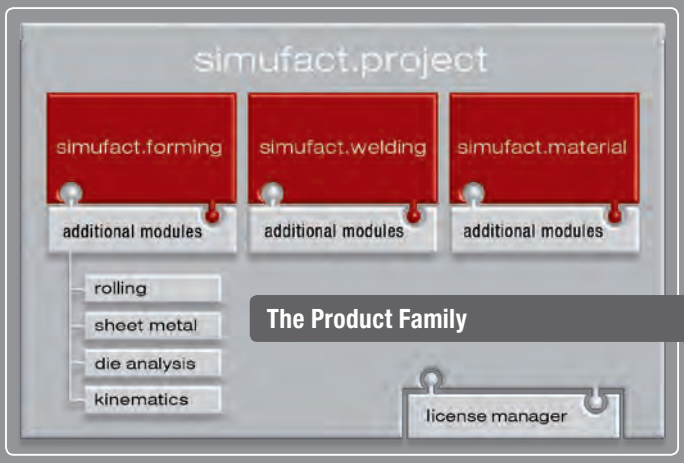


Warrantors of highest quality

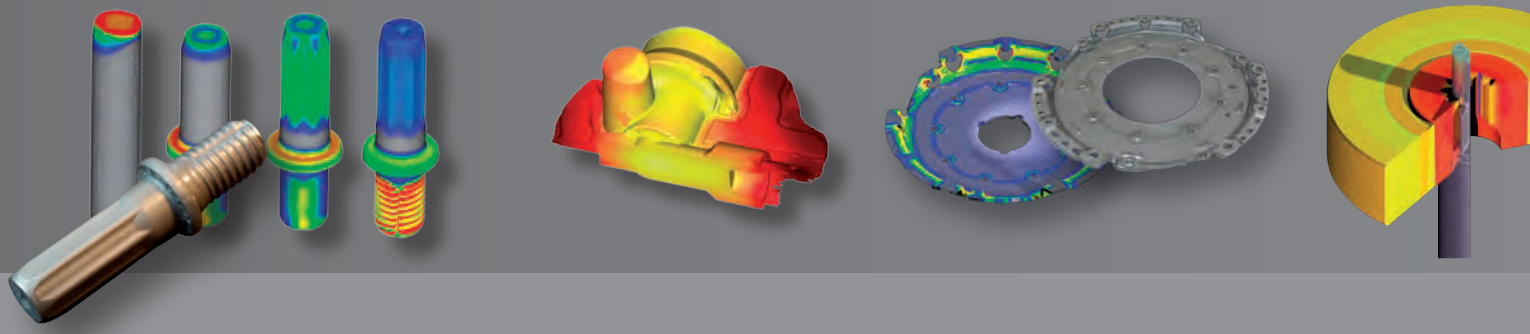
- Dual Solver technology: optimized MSC.Marc Solver plus IFE WELDSIM Solver
- different heat sources (Goldak model, cylindrical volume sources, surface heat sources with Gauss distribution and combinations thereof)
- comparison of simulation results with real microsections through “Weldmonitor”- function
- real stress conditions
- welding paths in real speed, direction and inclination

About Simufact Engineering

Simufact Engineering GmbH is an internationally acting software house and service company for complex process simulation in the manufacturing industry. The company has been developing and ministering simulation solutions for manufacturing design and optimization in the metal processing for 15 years. Within this area, we count among the leading companies. Our customers are medium sized companies, mostly suppliers of automotive and aviation industry, plant engineering companies as well as international trusts.



The Product Family



Around Simufact.welding

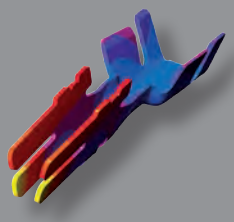
The Simufact product family with its solutions is the ideal basis for an optimized consistent process chain:

Simufact.welding

Simufact.welding is a customized software solution for analysis and optimization of welding processes. The central task of Simufact.welding is the examination of welding distortions. Moreover, the analysis of heat affected zones helps the expert to draw conclusions on the properties of welding seams.

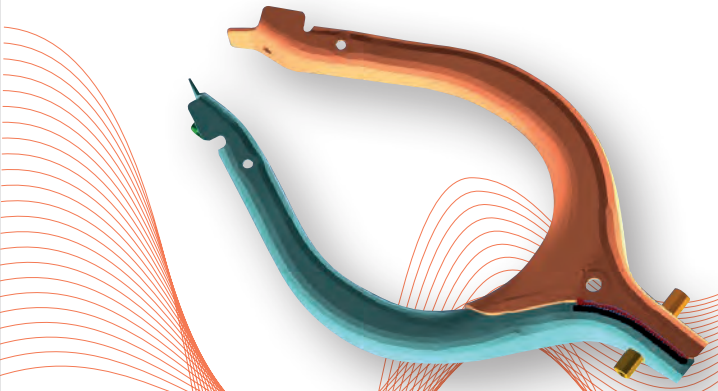
Simufact.forming sheet metal

Simufact.forming sheet metal is a special module based on Simufact.forming basic. It supports the process developer in design and optimization of die-cutting and bending processes. Simulation of forming sheet metal structures, die-cutting and clipping operations as well as tool analysis belong to the previously mentioned.



Simufact.material

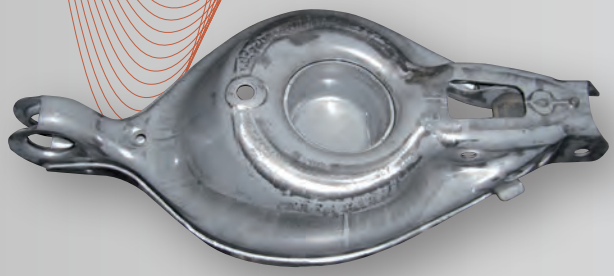
Simufact.material is built up of modules and subdivided in several applications in order to analyze material behavior and component properties. A broad material data base with a large spectrum of qualities and range of validities is part of Simufact.material as well as modules for the calculation of phase transformation and phase rates for the examination of recrystallization processes (dynamic and static) and grain growth.
Simufact.material is a permanently increasing library for the calculation of heat treatment procedures and for the analysis of material properties.

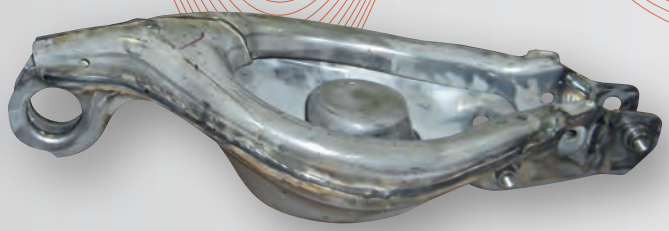


Experiences and Success

Optimize your development and manufacturing processes in cooperation with Simufact by applying the most actual technology: Simufact.welding.

Ensure your future competitiveness and benefit from the Know-how of Simufact Engineering.





"For our research applications, welding simulation is a precious instrument for quick estimations as well as for a detailed cause analysis of component distortions due to welding.
Thanks to the efficient user interface of Simufact.welding our "time to solution" in welding simulation is clearly reduced."

Dr. Christopher Schwenk,
Department Manager Joining Technology
Fraunhofer Institut für Produktionsanlagen und Konstruktionstechnik (IPK), Berlin

"Simulation of welding processes is decisive when you are heading for optimization of welding technology in order to design auto-mobile structures with higher stability but thinner metal sheet.
F.tech as a partner of industry is engaged in a long term project of the "Center for Advanced Vehicular Systems (CAVS)", one of the leading research institutes at the Mississippi State University. This project is also supported by the US Department of Energy.
Simulation-supported optimization of production processes is one of the focuses of this project wherein Simufact.welding turns out to be an inestimable tool, not only for ambitious research but also as a platform for knowledge and technology transfer into industry."

Prof. Keiichi Motoyama
(Mississippi State University) &
Dr. Bing Liu
(F.tech R&D North America Inc.)

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