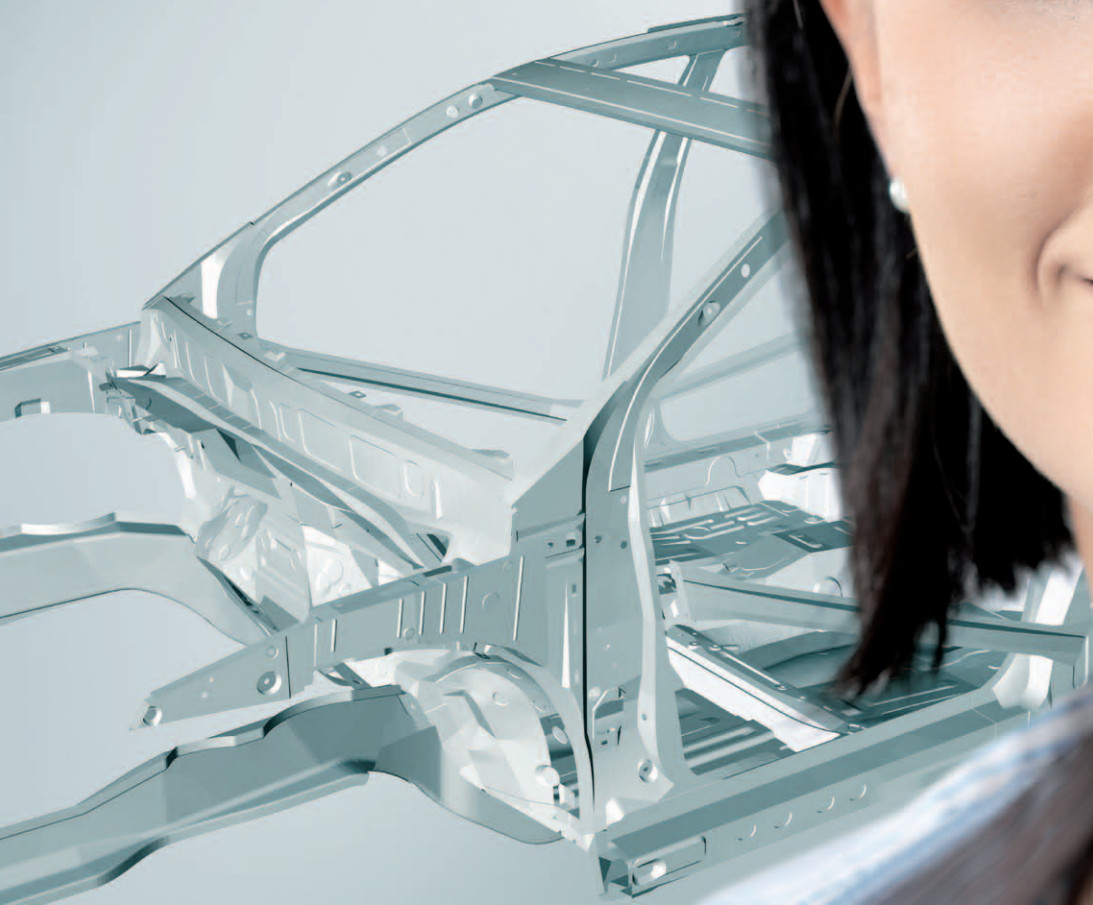


phs-ultraform®



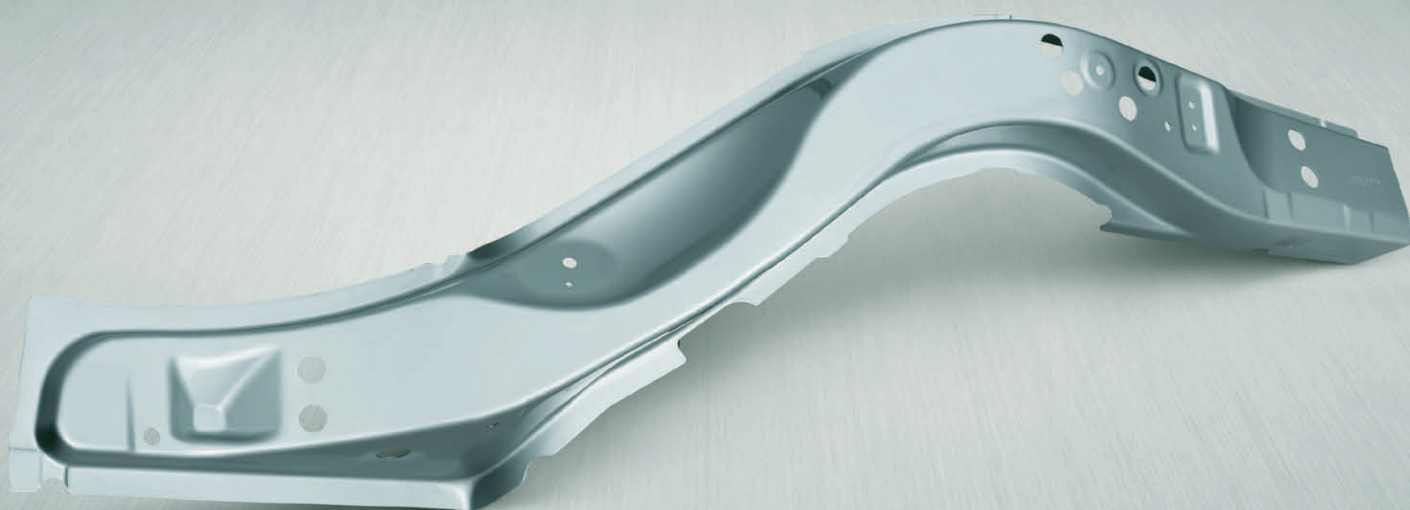
phs-ultraform®

The press-hardening steel benchmark

Carina Baumgartner, Customer service

voestalpine Steel Division
www.voestalpine.com/steel

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phs-ultraform®

Hot-dip galvanized steel strip
for press-hardened components

Convincing advantages

- Extreme strength of up to 1,800 MPa
- Excellent cathodic corrosion protection
- Complex components achievable, even as tailored tempered parts
- Large component geometries possible
- Best crash behavior
- High dimensional accuracy and uniform strength distribution
- Less tool wear with high unit numbers
- Processing of blanks made of a wide variety of steel grades and thickness combinations
- Simulation of the entire process chain, including component properties

Highest strength and corrosion resistance

An innovation of voestalpine, phs-ultraform® combines the benefits of press-hardened components with the high-quality corrosion resistance of hot-dip galvanized steel strip. phs-ultraform® is the benchmark with regard to freedom of design, dimensional accuracy, process reliability in safety-relevant components subject to heavy corrosion and contributes substantially to lightweight design and safety.

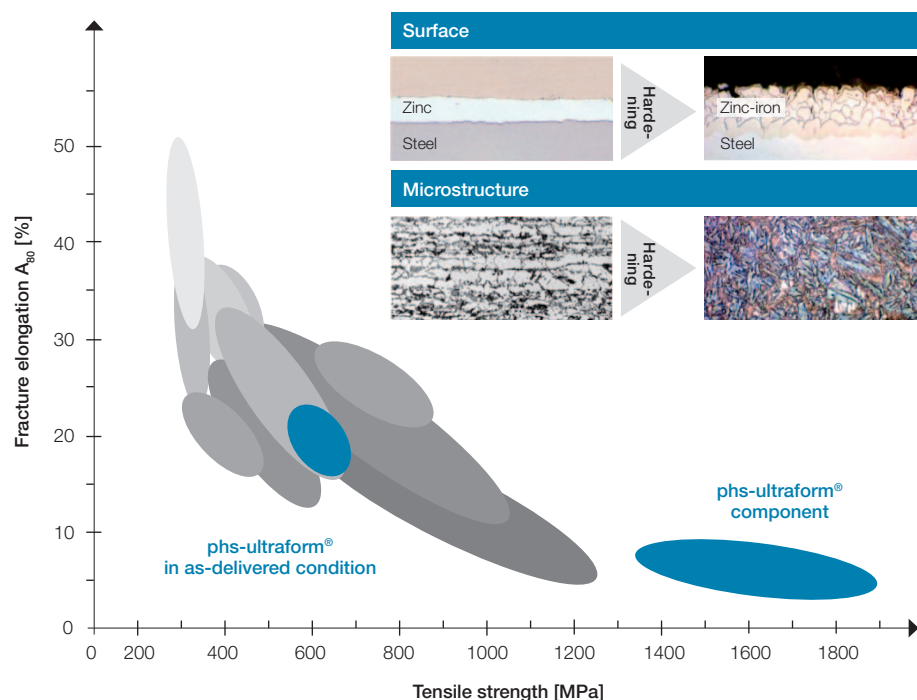
Lightweight components of the future

Lightweight construction with phs-ultraform® minimizes fuel consumption and lowers CO₂ emissions while greatly enhancing passenger safety. Consequently, steel remains the preferred material when compared to alternatives such as aluminum and carbon-fiber-reinforced plastics.

Just the right solution to every requirement: Depending on customer demands, phs-ultraform® can be processed using the direct or indirect process.

Tensile strength and fracture elongation of phs-ultraform®

In comparison to other cold-rolled steel grades



Active corrosion protection is the best corrosion protection

Zinc coating as a means of corrosion protection has been a conventional state-of-the-art technology for many years. The active mechanism of zinc galvanization is so-called cathodic corrosion protection in which a sacrificial coating of zinc on steel parts protects them from oxidation.

Proven protective mechanism

Through an innovative technology that takes advantage of the interaction between phs-ultraform® material and the manufacturing process, it has become possible for the first time to implement this time-tested protective mechanism for press-hardened components.

- Cathodic corrosion protection
- Guaranteed weldability



phs-ultraform® 1500 Z140 (hardened)
Creepage in transverse microsection after 10 weeks,
VDA Test 621-415



**Bright-finished press-hardening steel
(22MnB5, hardened)**
Creepage in transverse microsection after 10 weeks,
VDA Test 621-415

phs-ultraform® in the indirect process

Optimized production process for freedom of design with highest dimensional accuracy

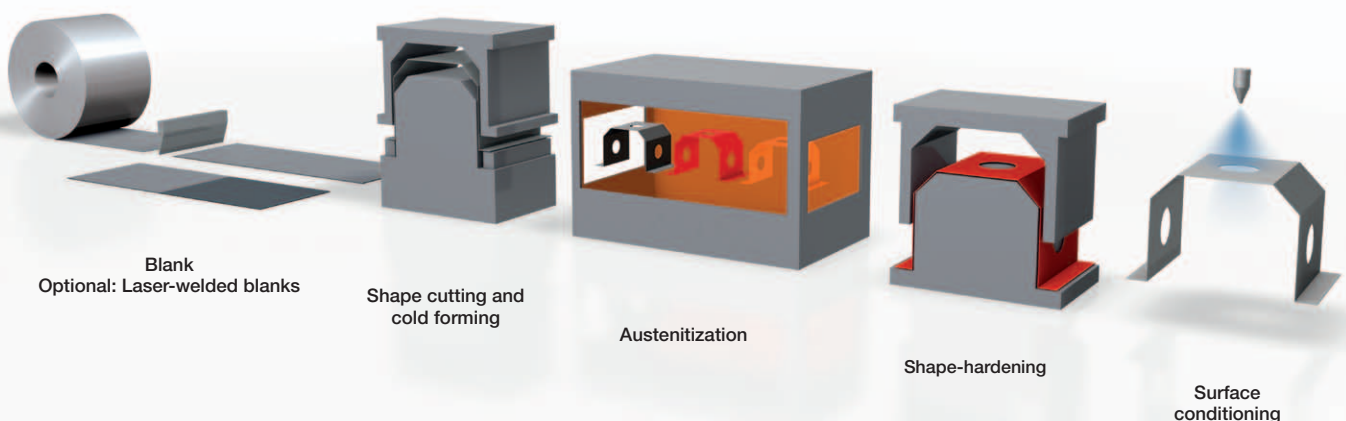
voestalpine looks back on many years of serial experience with indirectly processed phs-ultraform®. The indirect hot-forming process has been optimized in that final cutting is performed prior to hot forming. voestalpine provides users freedom of design with highest dimensional accuracy in achieving custom-designed and weight-optimized component geometry.

The indirect process optimized by voestalpine

In indirect processing, steel blanks made of phs-ultraform® are formed and cut to final geometry using conventional cold-forming technologies. The cold-formed components are then heated to 900°C. The annealed component in warm condition is then shape-hardened and cooled in the press while finalizing the geometry. As an innovation leader, voestalpine is also capable of producing tailored-property parts without additional cycle time.

The advantages

- Cold forming with low forming forces similar to those of HX380LAD
- Efficient cutting process in unhardened condition
- Zinc layer causes good lubricating action between component and shell die
- Pre-formed components lead to minimum shape-hardening tool wear
- Short cycle times resulting from rapid cooling
- Consistent strength across the entire component
- High dimensional accuracy without any elastic spring-back following shape-hardening
- Excellent crash performance because the material is not cut in hardened condition



phs-ultraform® in the direct process

Optimized production process for simple component geometries

Components with cathodic corrosion protection can now also be processed in the direct process with highest dimensional accuracy.

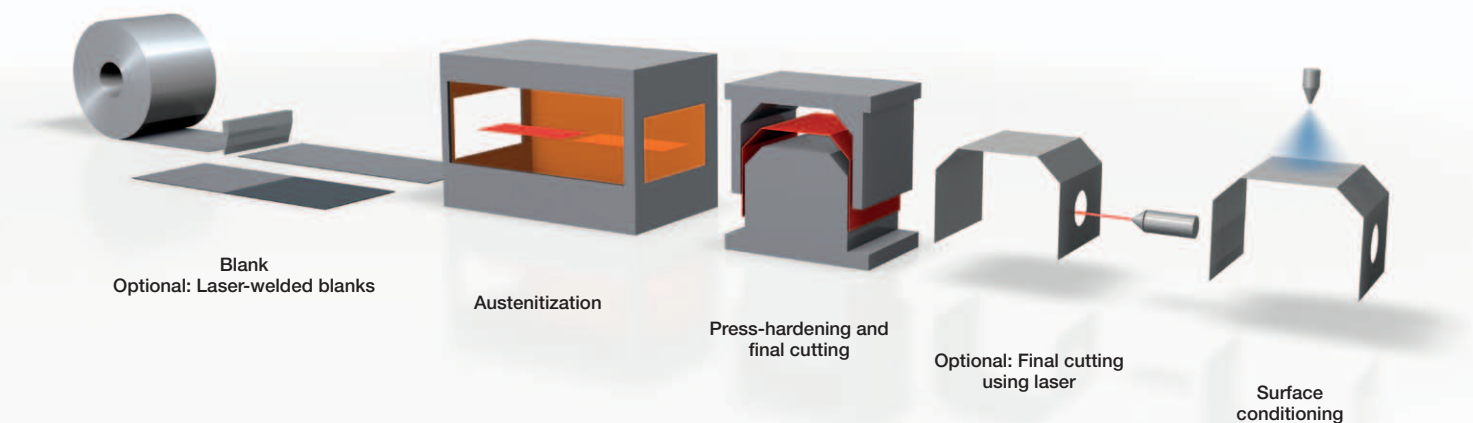
The direct process

Steel blanks are heated to approximately 900 °C in the direct press-hardening process and subsequently formed and hardened in a cooled tool until the final geometry is achieved.

voestalpine is a leading producer of hardened steel components with cathodic corrosion protection.

The advantages

- Short cycle times resulting from rapid cooling
- Zinc layer causes good lubricating action between component and shell die
- Suitable for pressing components in direct-process press-hardening lines





phs-ultraform® tailored-property parts

Production of function-optimized components

phs-ultraform® can be formed in the direct as well as indirect process into components with optimized crash performance.

Multifaceted and function-optimized

Complex geometries and special strength properties can be achieved by using special heat treatment processes during heating, cooling and tempering after hardening and by using tailor-welded phs-ultraform® blanks. Application-specific component integration makes it possible to reduce the number of required crash-absorbing components and results in enormous lightweight savings.

- Varying thickness and steel-grade combinations in tailor-welded blanks without coating removal in the laser-weld zone
- Functional optimization of the component through partial heating (tailored heated parts), partial cooling in the tool (tailored cooled parts) and subsequent partial annealing of the components (tailored tempered parts) possible.

Deformation precisely where it is needed



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phs-ultraform® sets new benchmarks in car manufacturing

phs-ultraform® is the solution to lightweight, safety-related components subject to heavy corrosion: stiffeners, A and B columns, sills, tunnels and bulkheads. Further applications are continually evaluated in collaboration with our customers.

One decisive step ahead

voestalpine is your partner from development to the finished product, providing software simulation of the entire process chain through determination of final component properties.

With voestalpine as your partner, you are always a decisive step ahead in the area of lightweight design.





Technically more advanced. Successful together. voestalpine Steel Division – the partner you can trust.

High-quality materials are the basis for our products. We strive to be the best partner for our customers and want to provide them with the best-possible solutions. We focus our expertise on two aspects:

The personal aspect, with dedicated and highly competent employees

The technical aspect, with high-quality methods, products and services

The companies in the voestalpine Steel Division and their employees understand partnership to be the following:

- Understanding for their customers' business
- Expertise and reliability
- Responsibility for satisfactory project completion
- Partnerships based on trust

Many years of successful partnerships with our customers prove our point.

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