

FORMING THE FUTURE



## FULL SPECTRUM HYDROFORMING FROM SCHULER

# EXPERIENCE AND EXPERTISE. A SUCCESS STORY OF IMPROVING COMMERCIAL AND TECHNICAL ASPECTS OF HYDROFORMING.



Fully automatic tubular hydroforming system at a German automobile manufacturer.

**Schuler's system experience.** In automotive production, tubular hydroforming has opened a wide range of possibilities for designing light weight and higher strength components used in body-in-white structures, frames and exhaust components. For some time now, the process has been an essential component in automotive production. As a system partner, Schuler offers extensive solutions for automobile manufacturers and suppliers to achieve all the advantages of the hydroforming process, significantly strengthening their competitive position. Hydroforming is one of Schuler's key manufacturing technologies to support lightweight vehicle designs.

#### SCHULER SYSTEM EXPERTISE – COMPETITIVE ADVANTAGES FROM THE IDEA THROUGH TO SERIES PRODUCTION.

**More than 110 presses in the market.** Schuler possesses proven expertise in hydroforming, and can look back on an extensive success story. This is verified by more than 110 hydroforming press lines that Schuler has installed in the automotive and component industries. As a globally active



The five lightweight manufacturing technologies from Schuler.

full service partner, Schuler knows all of the ins and outs of the automotive market, and is entirely at home in the process. Schuler offers ground-breaking solutions to support the trend of lightweight vehicle designs.

#### FULL SPECTRUM – HYDROFORMING FROM SCHULER

For 30 years, Schuler has supported the automotive sector to set the standards in mass production of vehicle components with its hydroforming presses. As a technological and world market leader in forming technology, Schuler possesses unique experience in the automotive industry, and develops forward-looking market solutions with extensive process knowledge.

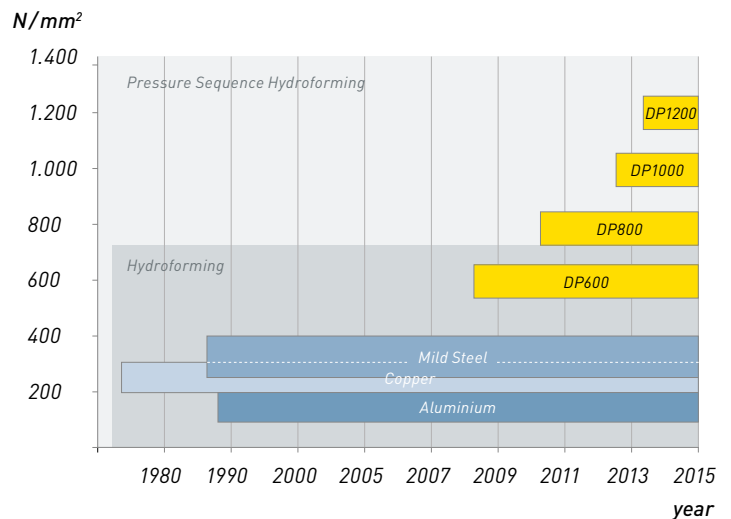
# FULL SPECTRUM. THE WORLD OF HYDROFORMING.

**Hydroforming tailored to requirements.** Reducing weight in automotive designs calls for the use of light materials or, high-strength and ultra high-strength materials. Schuler offers design and development process expertise for forming safety-relevant, complex components, frame structures and body-in-white components. Schuler provides support for part design, processes, dies, production and equipment for your requirements. Advanced component geometries and materials require a thorough understanding of the entire process to deliver efficient commercial solutions that are cost effective to develop and manufacture, while meeting critical performance targets in the final design.

## ADVANCED DEVELOPMENT, EFFICIENT COMMERCIALIZATION.

Each component is unique in terms of the forming requirements of the material, the hydroforming process and parameters. Our specialists can help your designers take an efficient approach to develop designs. We provide FEA analysis for feasibility and identify potential areas of concern – for example wrinkles, thinning or splitting. Our experience can help deliver part and die designs that streamline the development process to meet today’s demanding timelines. Schuler’s unique approach to design and prototyping can reduce development costs and initial die and launch expenses. This integrated development approach makes hydroforming more economical than ever before.

*Development of stable production processes for advanced materials in hydroforming.*



## FULL SPECTRUM HYDROFORMING FROM SCHULER

**The right process for the application.** Schuler has experience in single step high pressure and pressure sequencing type hydroforming processes. Traditional high pressure hydroforming is best matched to applications where there is a high degree of expansion, such as exhaust components, Y pipes and T pieces. Pressure sequence hydroforming has an advantage for high-strength and ultra high-strength steels with low elongation values, as forming takes place without expansion and at lower pressure – which delivers a more uniform wall thickness distribution. Hydroforming these advanced materials supports the demands of lightweight automotive production by reducing weight while meeting safety standards in frame structures and body-in white components. Hydroforming is not only





B-pillar component, material DP1000.

used for higher-strength and standard steels, but also aluminum alloys and other non-ferrous materials.

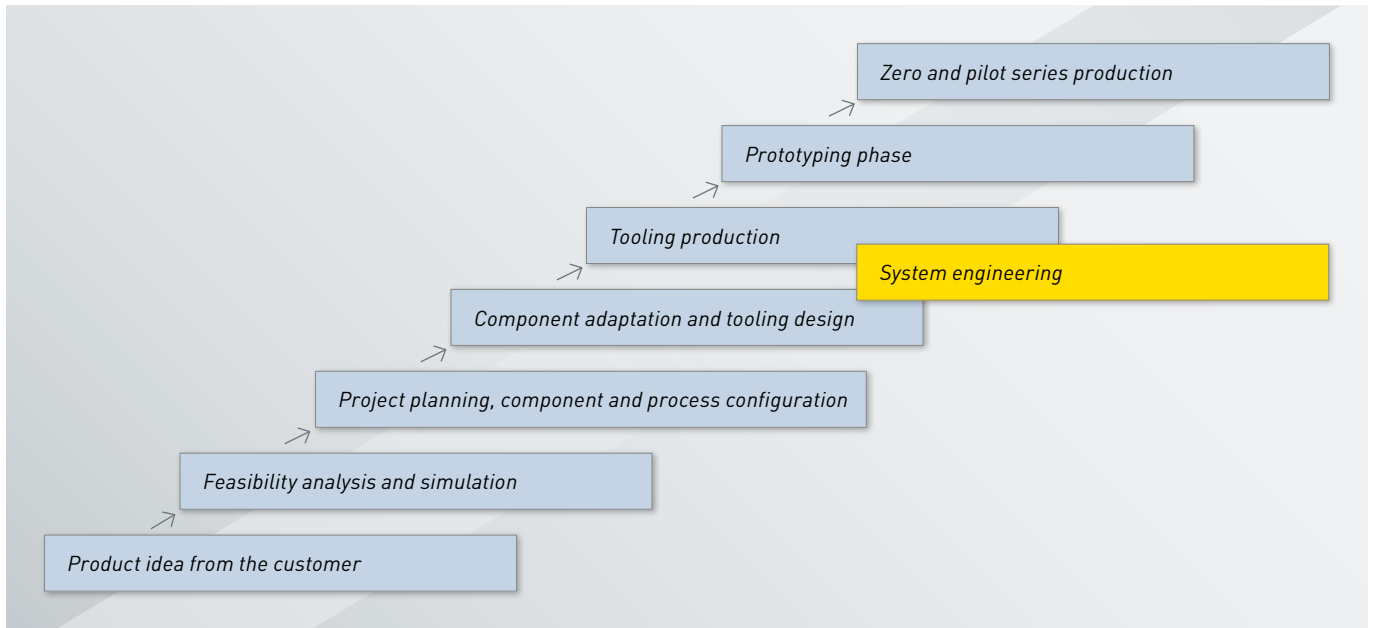
**Full spectrum of forming pressures.** In high pressure hydroforming, the die is closed without internal pressure and then calibrated to a higher maximum pressure. In pressure sequence hydroforming, the die is closed under internal pressure and then calibrated to a lower maximum pressure. The application and forming requirements define the pressure needed. For certain materials, a low internal pressure is sufficient for calibrating the contour and it is possible to combine both pressure sequence and calibration under maximum pressure at the same time.



Laser scanning in part development.

**ADVANTAGE SCHULER: GREATER EXPERTISE IN HYDROFORMING.**

Schuler's expertise is extensive and can cover all the bases. Our expertise ranges from concept validation, to part design and process development. We also offer die design, prototyping, and complete turnkey hydroforming systems. Schuler also can support try-out, low and high volume production of hydroformed tubular components.



A full spectrum partnership with Schuler offers efficient solutions throughout the engineering process.

**SCHULER OFFERS CUSTOMERS EXPERTISE FOR THE ENTIRE PROCESS OF HYDROFORMING.**

**Engineering from a single source.** Our experience and ability to support the entire development process ensures we offer optimized solutions. Having the right design and process is critical when it comes to high productivity, quality and efficiency in delivering the final product. A full spectrum partnership with Schuler guarantees high quality and successful part production.

Schuler develops tailor-made solutions. All the engineering comes from a single source, which means all development is integrated to ensure efficiency to the final design and production. Component-relevant criteria such as the necessary strength, optimum material, required tolerances and the surface composition are the starting point for component development. Based on this, Schuler analyzes the feasibility by FEA simulation and our experience with advanced and emerging materials. An initial production concept is worked out in parallel with the component development. The process steps identified in the simulation are used for building the upgradeable prototype tooling – which can also be a significant cost savings. When this design process is complete, the most important parameters will have been defined - such as the precise geometry,

material and process sequence from the starting material to the finished component.

**Schuler's commercial production experience.** Not only does Schuler offer its customers experience in hydroforming processes, toolmaking and component design, but we also have expertise in part production and materials handling. At our plant in Canton, Michigan – USA, Schuler operates a 3500 ton and 8500 ton hydroforming press in production. Here, it is possible to carry out small-batch production, prototyping and also provide high volume production backup for Schuler's customers. With this extensive process experience, Schuler has expertise in production flow, logistics and storage for an extremely wide range of components.

**PRESS SIZES**

Press force [kN]	16,000	35,000	50,000
Slide dimensions (mm)	2,000×1,600	3,500×2,500	3,500×2,500
Stroke (mm)	800	1,000	1,000
Shut height (mm)	800	1,000	1,000
Energy-efficient drives	yes	yes	yes

Other sizes and dimensions on request.



Tooling try-out.



Automated hydroforming line.

#### COMPLETE TOOLMAKING AND STANDARDIZATION.

Schuler develops and produces hydroforming tooling, from prototype testing to series-production dies. The range of tooling extends from components in appliances and off-road vehicles through to highly advanced systems for processing ultra high-strength steel automotive components. The tooling is designed based on efficient part designs and processes, and can be tested on in-house presses and economically upgraded into full-scale operation. Schuler can also design dies flexible enough to be used in equipment in every region of the world – which helps to standardize and reduce costs.

#### TRAINING AT SCHULER.

Schuler offers in-depth training for the full spectrum of hydroforming design, development and production. Participants can benefit from the expertise and unique knowledge possessed by Schuler's specialists. They are given the insight and information needed to create feasible designs and apply hydroforming processes according to their requirements.

#### SCHULER SERVICE – STATE-OF-THE-ART SERVICE FOR MORE PERFORMANCE

Schuler Service offers a tailored portfolio of services covering the entire life cycle of your equipment. Over 900 service employees worldwide provide expert support 24/7 in close cooperation with you – our partners. Our main priority is always to ensure the maximum productivity and safety of your production equipment in order to secure your company's continued success.



[www.schulergroup.com/  
service\\_en](http://www.schulergroup.com/service_en)

**ABOUT THE SCHULER GROUP – WWW.SCHULERGROUP.COM**

Schuler is the technological and global market leader in the field of forming technology. The company provides presses, automation solutions, dies, process expertise and service for the entire metalworking industry and for lightweight automobile construction. Its customers include automotive manufacturers and suppliers, as well as companies in the forging, household appliance, packaging, energy and electronics industries. Schuler is a leading supplier of minting presses and implements system solutions for a wide range of different high-tech sectors. The company has a presence in approximately 40 countries with roughly 6 600 employees. Schuler is majority-owned by the Austrian ANDRITZ Group.

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