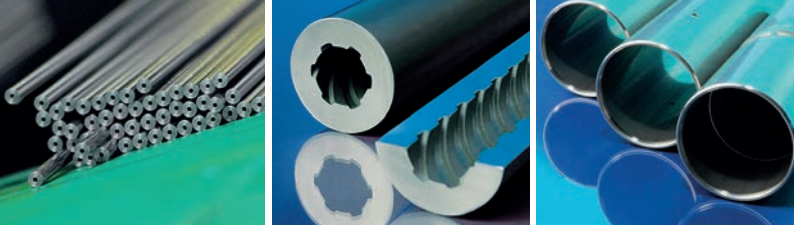




**Precision Steel Tubes**  
for the Automotive Industry



# The Company



## Salzgitter Mannesmann Precision – Your Competent Partner for Innovative Developments

As one of the leading manufacturers of cold drawn seamless and cold drawn welded Precision Steel Tubes Salzgitter Mannesmann Precision (SMP) offers a broad production range along with exceptional expert advice on material, processing, sales and services. Our efforts target at intelligent solutions for the utmost customer satisfaction. As SMP is well embedded into the Salzgitter group many synergies emerge strengthening performance from the pre-material to the final product.

The production program comprises seamless and welded Precision Steel Tubes manufactured according to international standards of the automotive, mechanical engineering and energy industries.





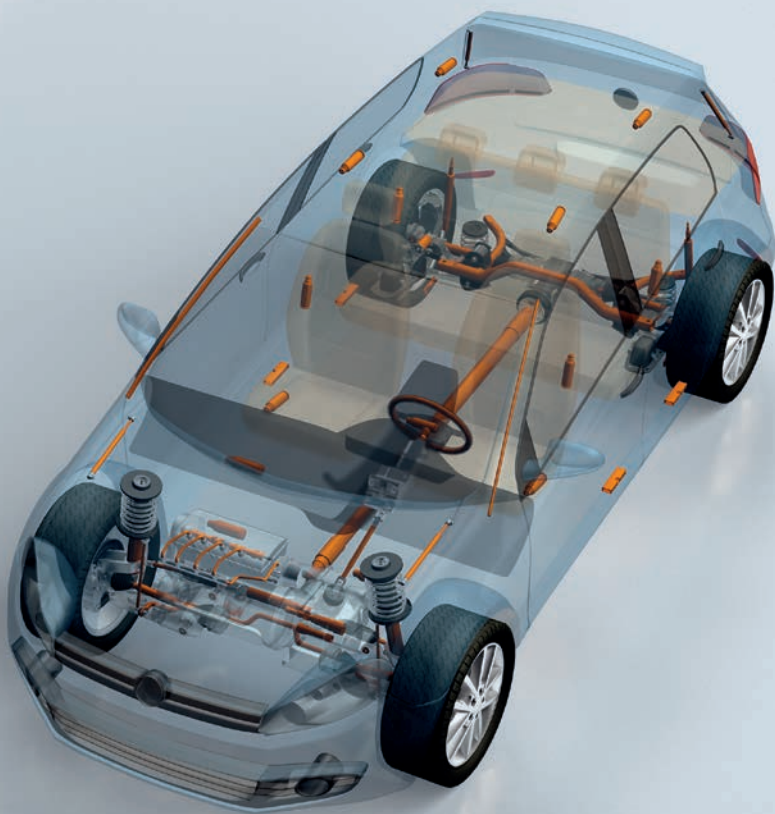
## Germany, France, Netherlands and Mexico

Salzgitter Mannesmann Precision GmbH is based in Mülheim an der Ruhr with around 2,400 employees worldwide. Its activities are worldwide with thorough international access to be your preferred partner for high quality tubes. Four locations in Germany, three in France, one in the Netherlands and one in Mexico form the basis for high delivery performance and customer satisfaction.

Salzgitter Mannesmann Rohr Sachsen, based in Zeithain supplies pre-material (seamless hot rolled hollows) to the precision tube mills of the Salzgitter Group.

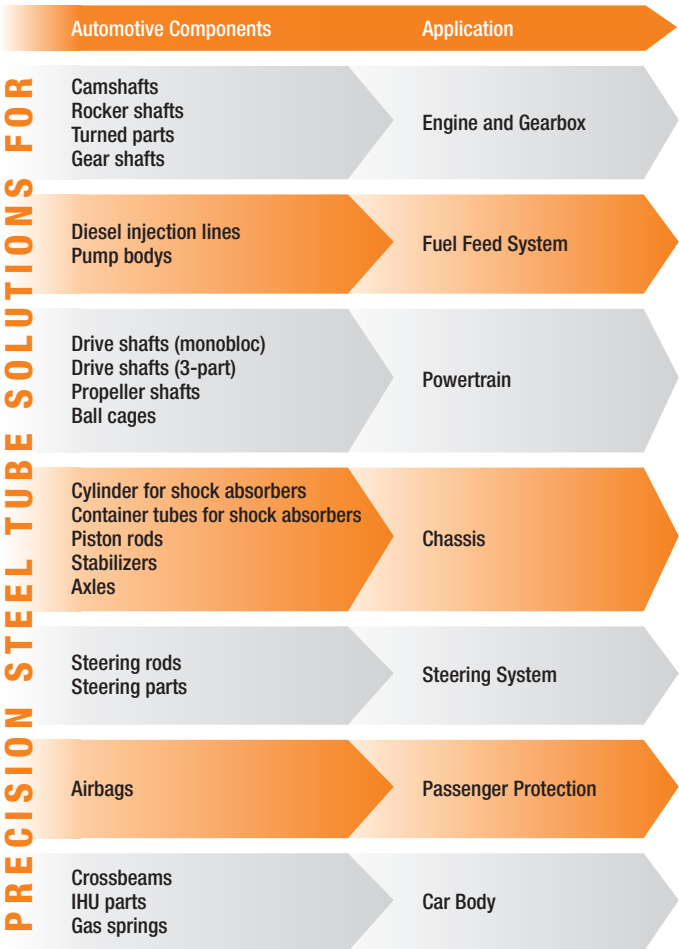


# Automotive



## Precision Steel Tubes for the Automotive Industry

An outstanding strength of SMP is its technical support and consulting service targeting at customized solutions for the Automotive Industry.

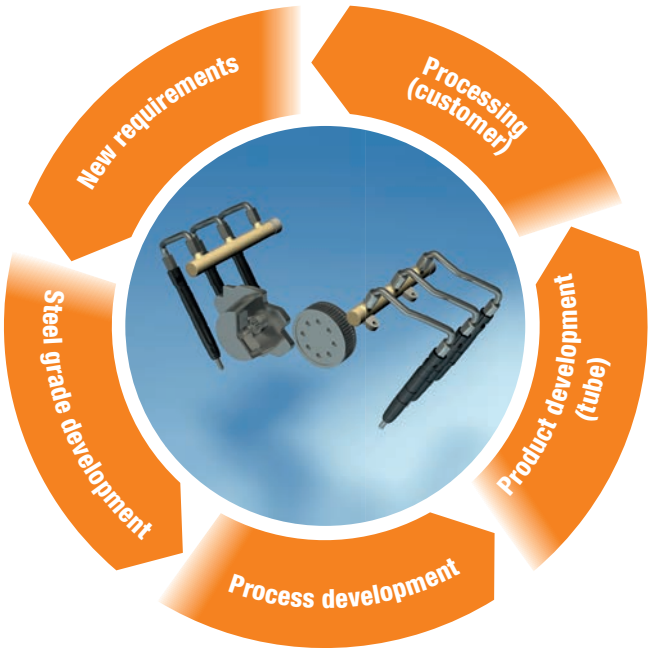


## Tubes for Diesel Injection Lines



# Tubes for Diesel Injection Lines

## Diesel Injection Tubes for 2,500 bar and Even Higher Pressures



**Expectations tend to become more and more challenging in the automotive sector.**

Technical requirements as well as legislative constraints are strongly linked to higher injection pressures. Today's market predictions project injection pressures rising up to more than 2,500 bar for cars while these might go beyond 3,000 bar in the case of heavy-duty vehicles.

## Tubes for Diesel Injection Lines



### **Salzgitter Mannesmann Precision GmbH**

offers a large precision tube portfolio intended for Diesel Injection Lines comprising high end as well as economic solutions. The product portfolio (DSG 1600 and DSG 1800) was complemented with the new Common Rail Grade ('CRG') series. The CRG series offers excellent steel and surface qualities (acc. to ISO 8535) engineered for advanced fatigue resistances based upon special micro alloying concepts. Due to long-term experience scatter of mechanical characteristics and surface properties are managed within narrow scatter bands. In combination with adequate autofrettage processes extreme system pressures may be realized.



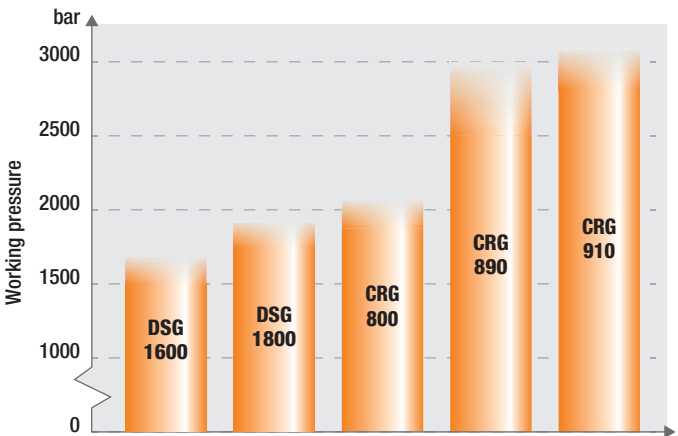
# Tubes for Diesel Injection Lines

## Customer expectations

- Emission reduction measures (e. g. CO<sub>2</sub>, nitrogene oxides, soot emissions)
- Meet the exhaust emission standards
- Efficient use of carbon reserves
- Driving dynamics through higher specific engine power

## Tube requirements

- Bending ability
- Corrosion resistance
- Excellent fatigue strength
- Design criterion for 1 ppm pressure level:  
(Operating pressure + peak pressure) for 10<sup>7</sup> load cycles
- Dedicated autofrettage process



Material and technology development – evolution of injection pressure

## Tubes for Stabilizers



## Light-Weight Concept – Stabilizers Made of Precision Steel Tubes

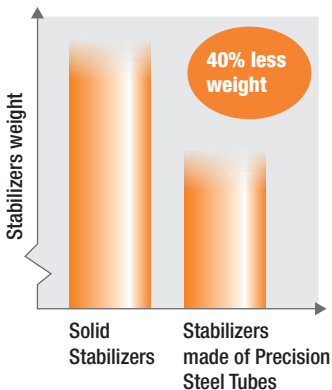
One of the key points in Automotive Industry is the continuously increasing demand for weight reduction for next generation passenger car platforms. Due to pollution taxes weight reduction develops into a more and more indispensable condition.

### Customer expectations

- High strength
- High surface integrity to fulfill dynamic load and fatigue life requirements
- Suitability for subsequent processing
- Weight reduction

### Tube requirements

- Bending ability and torsional requirements
- Demanding requirements on micro-cleanliness
- Microstructural requirements



SMP has many years of experience in the production of such kind of Precision Steel Tubes in a constant high quality. SMP can offer tubes for all dimensions in desired delivery conditions or desired materials such as Manganese-Boron steel grades.

## Tubes for Powertrain



## Precision Steel Tubes for Side Shafts: Monobloc Tubular Shafts (MTS) and Welded Tubular Shafts (WTS)

Precision Steel Tubes for Welded Tubular Shafts are endowed with outstanding geometrical properties and delivered as high-quality Carbon, Manganese Boron or air hardening steel. Dedicated wall thickness and eccentricity tolerances give way for excellent dynamic response as well as fatigue properties.

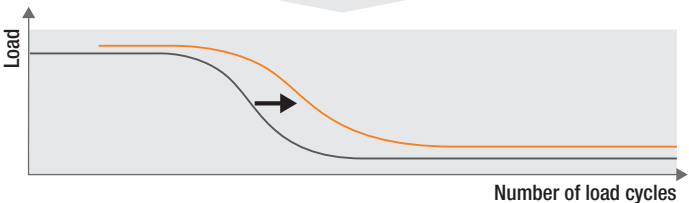
Precision Steel Tubes for Monobloc Tubular Shafts are designed either for quenching and tempering (C and CrMo-grades) or hardening processes (MnB-grades). Our steel material shows well-defined microstructure and large deformation capacities perfectly suitable for any deformation process carried out at low temperature, just as needed for tapering and splining.

### Customer expectations

- Cold forming capacity (MTS)
- Weldability (WTS)
- Excellent dynamic response
- Appropriate static and fatigue properties

### Tube requirements

- Geometrical characteristics within narrow scatter bands (wall thickness, diameter, eccentricity among others)
- Well-defined, homogeneous microstructure
- Narrow scatter band of strength properties



## Tubes for Powertrain



## Precision Steel Tubes for Longitudinal Shafts: Propeller Shafts

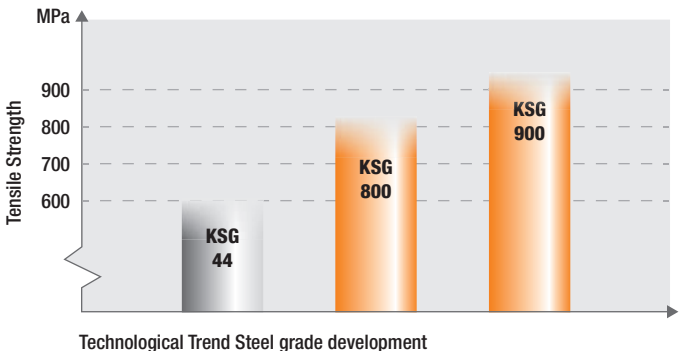
Precision Steel Tubes for Propeller Shafts are endowed with outstanding surface and geometrical properties. The steel material solutions of the well-established **KSG** series are finely graded and feature excellent static as well as fatigue strength properties.

### Customer expectations

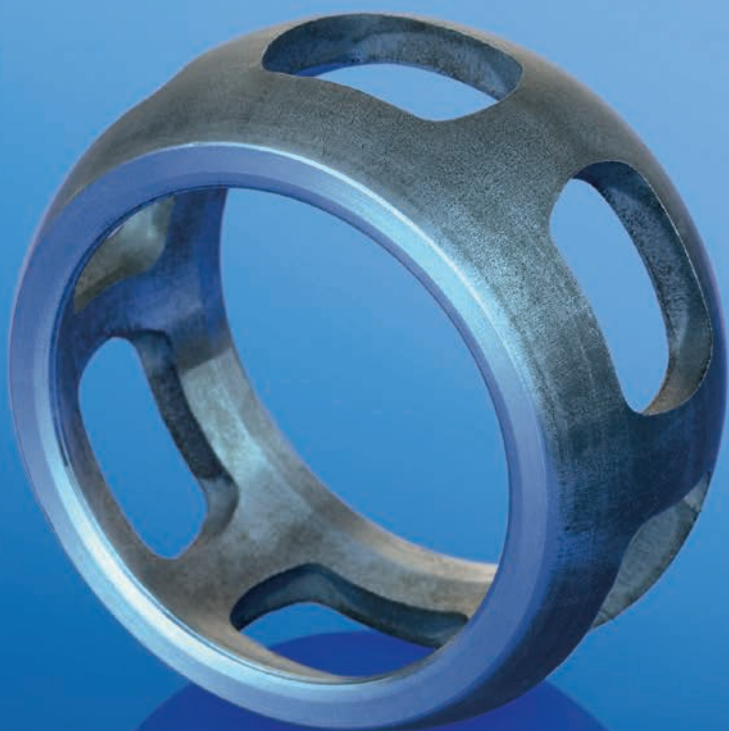
- Weldability
- Excellent dynamic response
- Excellent strength properties (static strength and fatigue strength) within narrow scatter bands

### Tube requirements

- Geometrical characteristics within narrow scatter bands (wall thickness, diameter, eccentricity amongst others)
- Well-defined, homogeneous microstructure
- Narrow scatter band of strength properties



## Tubes for Powertrain





## Ball Cages Made of Precision Steel Tubes

Precision Steel Tubes for Ball Cage Tubes or Blanks are endowed with outstanding surface and geometrical properties and well-defined microstructure.

### Customer expectations

- Formability, machinability
- High surface quality
- Adequacy for (case) hardening
- Cross sectional volume constancy

### Tube requirements

- Geometrical characteristics within narrow scatter bands (wall thickness, diameter, eccentricity amongst others)
- Well-defined, homogeneous microstructure
- Customized chemical analysis
- Demanding requirements on micro-cleanliness

SMP has long-term experiences and technology know-how to produce customized Precision Steel Tubes for Ball Cages. Moreover, a large steel grade portfolio for C-steels, quench and tempering steels or case hardening steels can be chosen for dedicated solutions.

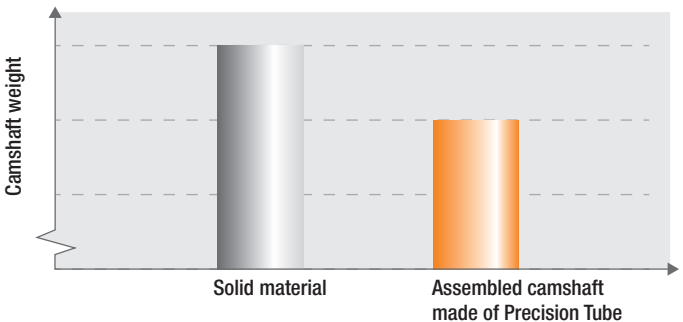
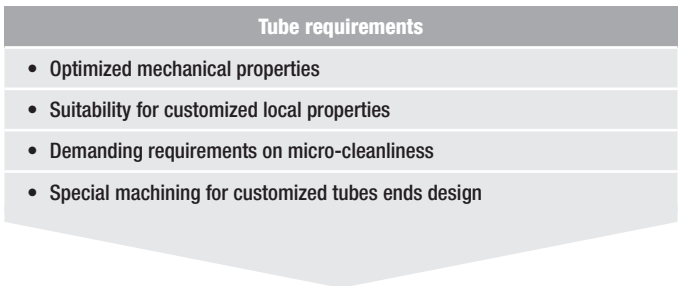
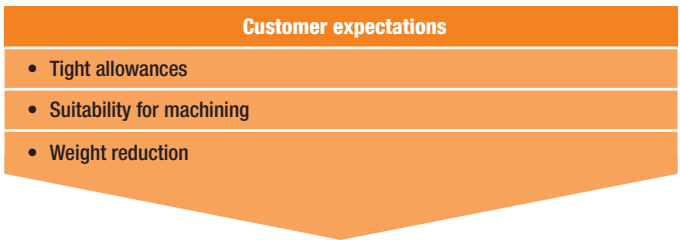
## Tubes for Assembled Camshafts



# Tubes for Assembled Camshafts

## Assembled Camshafts Made of Precision Steel Tubes – Light-Weight Solution for the Automotive Industry

By using Precision Steel Tubes as hollow shafts for assembled camshafts, a significant weight saving can be obtained compared to forged solid components. SMP has long-term knowledge in production of such specialized tubes.



## Tubes for Airbags



## Precision Steel Tubes for Hybrid Airbag Solutions

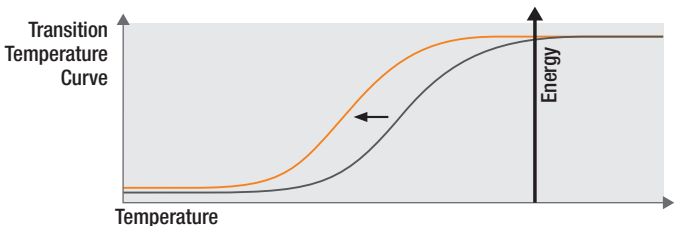
Seamless Precision steel tubes for Airbags feature outstanding toughness properties with very low transition temperatures dedicated even for operating temperatures as low as  $-60\text{ }^{\circ}\text{C}$ . Depending on the specific requirements airbag tubes are delivered either as micro-alloyed engineering steel or quench and tempering or even air hardening steel. Dedicated burst tests on tube in static as well as dynamic condition confirm excellent close-to-component toughnesses. SMP offers quench and tempering on the final tube product to offer a complete new family of airbag tube products.

### Customer expectations

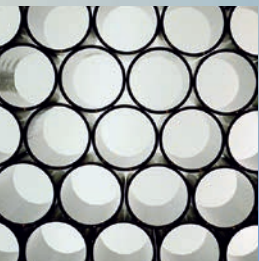
- Cold or warm forming capacity
- Weldability
- Excellent component toughness without any indication of fragmentation at low operating temperatures
- Suitability for light-weight concepts

### Tube requirements

- Well-defined, finely-graded and isotropic microstructures
- Excellent tube toughness properties featuring very low transition temperatures
- Excellent static and dynamic strength properties



## Tubes for Shock Absorbers



## Precision Steel Tubes for Shock Absorber

Manufacturers of shock absorbers are increasingly looking for solutions to optimize their own processes. Furthermore, solutions to reduce weight in the vehicle are in the focus. Precision Steel Tubes with higher strength combined with a steady good process behavior are needed. SMP stands for high quality Precision Steel Tubes for shock absorber.

### Customer expectations

- High surface quality (ready to use surface)
- Suitability for subsequent processing
- Formability

### Tube requirements

- Constant mechanical properties
- Tight allowances
- Cleanliness and high surface quality

SMP has long been a recognized partner not only as a supplier for cold drawn Precision Steel Tubes but also as a development partner in this market.

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