air & fluid systems GB
Our Competences

**protection systems**
- Corrugated-, Smooth-, Protection-Tubes
- Plastic-/Metal-tubes/Braidings
- EMC-/High Temperature Protection
- Optical Fibre Protection
- Flexible Circuit Protection (FFC/FPC)

**Injection Moulding Parts**
- Manifolds
- Connector Interfaces
- Cable Ducts/ -Rails/-Routes
- Vibration Protection
- Textile Protection
- Tapes

**mechatronic systems**
- Hazardous System Parts (ADR/GGVS)
- Multi Pole Plugs
- Helix-/Connecting Cables
- Terminal Boxes
- Electromechanic Components
- Temperature Probes/-Sensors
- Liquid Level Sensors
- Quality Sensors
- Relays
- Voltage Transformers
- Battery Switches

**connection systems**
- Tube Glands
- Cable Glands
- Integral Parts
- Fixing Materials

**air & fluid systems**
- Single-/Multilayer Tubes (up to 5-layers)
- Windscreen-Washer Tubes
- Coolant Tubes
- Filler Necks
- Quick Couplings
- Fuel-/Oil Tubes
- Air Flow Routing
- Ventilation Tubes
- Vacuum Tubes
- Tubes for Air Brake Systems
- Components & Modules for SCR-/ Urea-Systems (AdBlue):
  - Heatable Tubes
  - Air Volume Reservoirs
  - Air Flow Routing
  - Quality Sensors
  - Temperature Sensors

We protect technology.
Our Development-Services

Development/Design/Prototyping for:
Extrusion (up to 5 layers) and Injection Moulding

Support for Handling & Assembly
Mounting Tools
Ultrasonic Welding of Corrugated Tubes
Contact-Protection for mounted wires

Assembly Group Manufacturing

Product-Tests
Documentations
Drawings

On-Site Services:
Cutting Services for Corrugated Tubes „Cut on the crest”
Technical Application Advice
Resident Engineering
Worldwide on site

Additional Services:
Installation Studies
IMDS-data supply
Material development in cooperation with raw material manufacturers
Filling Simulations for injection moulding

Technical Support
Construction Programms/-Systems
Catia, Pro-Engineer, UG, NX2/1

Data-Exchange Formats:
IGES, STEP, CATIA, UG, DXF, DWG, PRT

We protect technology.
air & fluid systems

From single Products to Module Solutions

Single-/Multilayer Tubes (up to 5-layers)
Corrugated Tubes
Smooth Tubes
Windscreen-Washer-/Coolant Tubes
Filler Necks
Quick Couplings
Fuel-/Oil Tubes
Air Flow Routing
Ventilation Tubes
Vacuum Tubes
Tubes for Air Brake Systems

Components & Modules for SCR-/Urea-Systems (AdBlue):
Heatable Tubes
Air Volume Reservoirs
Air Flow Routing
Quality Sensors
Temperature Sensors

Services:
Assemblies
Manual
Semi-Automatic
Fully Automatic
Pressure Tests
Leak Tests
Our Competences

- Air-Routings
- Wiper-Water
- Fuel-Systems
- SCR-Exhaust Purification
Air-Routings

We protect technology.
Air-Routings

Crank Case Ventilation

Battery-Cooling / -Degassing

Secondary Air-Routing
Air-Routings for Heavy Trucks accd. to DIN 74323 – 74324-1&2

Applications:
- Pneumatic Break System
- Pneumatic Suspension System

Range of Application:
- Heavy Trucks
- Trailers
- Helix-Cables/Spindles
We protect technology.
Customer Specific Filler Necks

<table>
<thead>
<tr>
<th>Straight Form Extruded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermoformed Extruded Locking Mechanism Partieller Temperature Protection</td>
</tr>
<tr>
<td>Assembly: Holder, Cover, O-Ring</td>
</tr>
</tbody>
</table>

| Thermoformed Extruded Locking Mechanism |
| Assembly: Holder, Cover, O-Ring |
Advantages of extruded Filler Necks

- Flexibility
- Different wall thicknesses possible (In blow-moulding process nearly impossible)
- Most shapes are possible by thermoforming
- Cost-benefit of approx. 30% for the part compared to blow-moulding
- Cost-benefit of 20-50% for the tool compared to blow-moulding
Wiper-Water Applications > Headlight Washing System

Schlemmer Components and Modules
Example VW Touran:
- Corrugated Tube, Length: 450 mm
- Y-Coupling
- Corrugated Tube, Length: 125 mm
- 90° Coupling
- Corrugated Tube, Length: 1680mm with smooth sections
- Thermoforming
- Assembly
Wiper Water > Services

Thermoforming
Limited Installation Space in Vehicle Chassis Compartments demand complex geometries of Filling Tubes as well.

Thermoforming allows an exact fit of extruded Filling Tubes.

Technical Data:
Max. part size [mm]: 4500 x 1000 x 1000  
(length 6000 mm on request)

Resistance to heat: 150 – 180 °C (max. 250 °C)

Assemblies:
Accessories like Sealing Rings, Fixing Elements, Caps etc. allow numerous variations.

Final Pressure- Hydrostatic tests go without saying.
Fuel - Systems

We protect technology.
Fuel-System

Schlemmer Modules

Fuel tubes
- Corrugated-/Smooth Tubes up to 5 layers
- Customer specific solutions e.g. with border
- Assemblies e.g. with Quick-Connectors

Quick Connectors
customer specific

Liquid Level Sensor
Resonance Principle

Intank Application
(1-layer Smooth-/Corrugated Tubes)
Fuel-System > Fuel Tubes

Monolayer Smooth Tubes

- Material: PA 11, PA 12
- Applications: Diesel, Intank

Multilayer Smooth-/Coorugated Tubes up to 5 layers

<table>
<thead>
<tr>
<th>Outer-/Inner Layer</th>
<th>Barrier Layer</th>
<th>Adhesive</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA 6</td>
<td>EVOH</td>
<td></td>
</tr>
<tr>
<td>PA 11</td>
<td></td>
<td>Customer-specific</td>
</tr>
<tr>
<td>PA 12</td>
<td></td>
<td>ETFE</td>
</tr>
<tr>
<td>PP</td>
<td>PVDF</td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We protect technology.
SCR-Exhaust Purification Systems

SCR = Selective Catalytic Reduction
SCR-Exhaust Purification System for Heavy Trucks

- Temperature Sensor
- Quality Sensor
- Liquid Level Sensor
- Resonance Principle
- Air Volume Reservoir
- Air Tube
- Urea Tube (heatable)
- Spiral Tube with Heating Coil and Protection Tube

We protect technology.
„Special Assemblies“

 Applications
WAI = Water Assisted Injectionmoulding
GAI = Gas Assisted Injectionmoulding

“Intelligent Systems”
Customer Specific Air & Fluid Systems
1 Filler Neck
2 Liquid Level Sensor
3 Temperature Sensor
4 Media Carrying Tube, heatable
5 Control Unit
Quick-Coupling (no picture)
Assembly

Motor Ventilation

Oil Dipstick Guiding Tube
Y-Manifold 2-Components
Market Position

Summary

Schlemmer is accredited supplier for media carrying products.

We are listed development service provider for all well-known Tier 1 suppliers and OEMs and are already working on new solutions for future vehicle generations.

Objectives

Increase in market share with already developed products.

Market development in Overseas (USA, Asia).

Expansion of development and production competences for complex assemblies.

Market Positioning as Module Supplier
References

**Automotive:**

ACE Automotive Group
AFL
AMP
Bentley
BMW
BOSCH
Caterpillar
Coroplast
CLAAS
DAF
DaimlerChrysler
Karosa
Delphi
Kia Motors
Kromberg & Schubert
LADA
Lancia
LEAR
MAHLE
MAN
HYUNDAI
IVECO
JAGUAR
John Deere
MGICoultier
John Deere

**Industry:**

KKW
K+S
KraussMaffei

BPA
CompAir
Demag
ergotech
Die Bahn
DB
Dronningborg

Siemens
VDO
ADTranz
ALCATEL
ALSTOM
ABB
Arburg

Saint-Gobain Wire & Cable

We protect technology.
Thank you

We protect technology.