

**WE ARE**  
 **SCHERDEL**



**THE COMPANY**

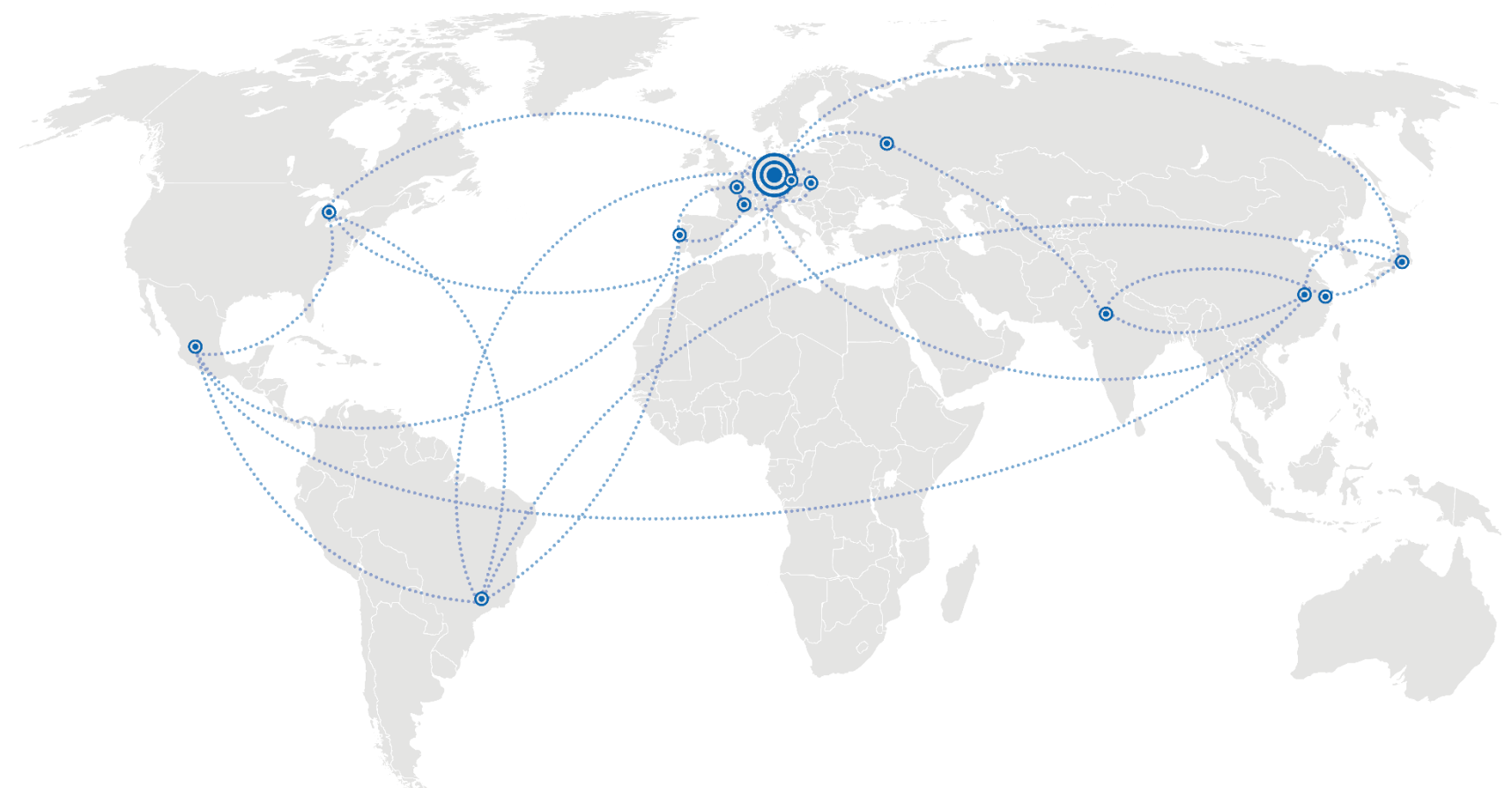
**SCHERDEL  
NORTH  
AMERICA**

**AUTOMOTIVE  
BUSINESS  
TECHNOLOGIES**

**SCHERDEL  
OFFERED  
SOLUTIONS**

# THE COMPANY

## A SHORT OVERVIEW



**Headquarter** Marktredwitz

### PRODUCTION SITES

GERMANY

#### EUROPE:

- Czech Republic Bor
- France L'Arbresle, Beauvais
- Portugal S.J. da Madeira
- Slovakia Myjava

#### AMERICA:

- Brazil Sorocaba
- México San José Iturbide, Silao
- USA Muskegon

#### ASIA:

- China Huzhou, Anqing
- India Jaipur
- Japan Nagoya

#### SALES CENTER:

- EUROPE Germany, Belgium, France, Portugal ...
- AMERICAS Brazil, Mexico, USA
- ASIA China, Japan, India

**11**   
Countries

**34**   
Locations

**45**   
Production plants

**6.800**   
Employees worldwide

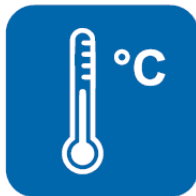
# WORLDWIDE SCHERDEL TECHNICAL EXPERTISE

## INNOTECH R & D

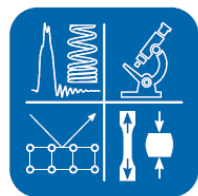
- ✓ Assembly & Surface Technology (Tool, Machine & System)
- ✓ Innovation & Quality testing labs
- ✓ Numerical Simulation Applied Research
- ✓ Spring Optimization / Calculation & Design
- ✓ Material & Process Development
- ✓ +350 Employees in R&D
- ✓ Kinematic & Dynamic Simulation
- ✓ Prototype Production
- ✓ Scherdel SIMENT Range Services include:



Metal Forming



Temperature



Physical Testing



Mechanical-Engineering



# THE COMPANY

## GREEN FOOTPRINT

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### RE-SOURCES

- ✓ Careful use of resources, because avoiding emissions is the best way.
- ✓ Includes optimizations in our production processes, use of waste heat and much more

### OWN PRODUCTION

- ✓ Own green power generation is massively expanded.
- ✓ You can already observe this at some Scherdel locations where photovoltaic systems are being built

### GREEN ENERGY

- ✓ Purchase of green electricity.
- ✓ The SCHERDEL Group also wants to contribute to the expansion of regenerative energy production on the market

**THE SCHERDEL GROUP IS GOING  
TO REDUCE ITS EMISSIONS BY 25% IN 2025**



# **SCHERDEL NORTH AMERICA**

# PRODUCTION PLANTS

## NORTH AMERICA



**SCHERDEL DE MEXICO**  
Silao de la Victoria, Gto



**CERTIFICATIONS**  
ISO 14001 | IATF 16949

**SCHERDEL SALES & TECHNOLOGY**  
Muskegon, MI



**CERTIFICATIONS**  
ISO 14001 | IATF 16949 | ISO 9001

**SCHERDEL WIESAUPLAST DE MEXICO**  
San Jose Iturbide, Gto



**CERTIFICATIONS**  
ISO 14001 | IATF 16949 | ISO 9001

**XMAX-Scherdel de Mexico**  
Silao de la Victoria, Gto



**CERTIFICATIONS**  
IN PROCESS

**SCHERDEL MEDTEC**  
Muskegon, MI

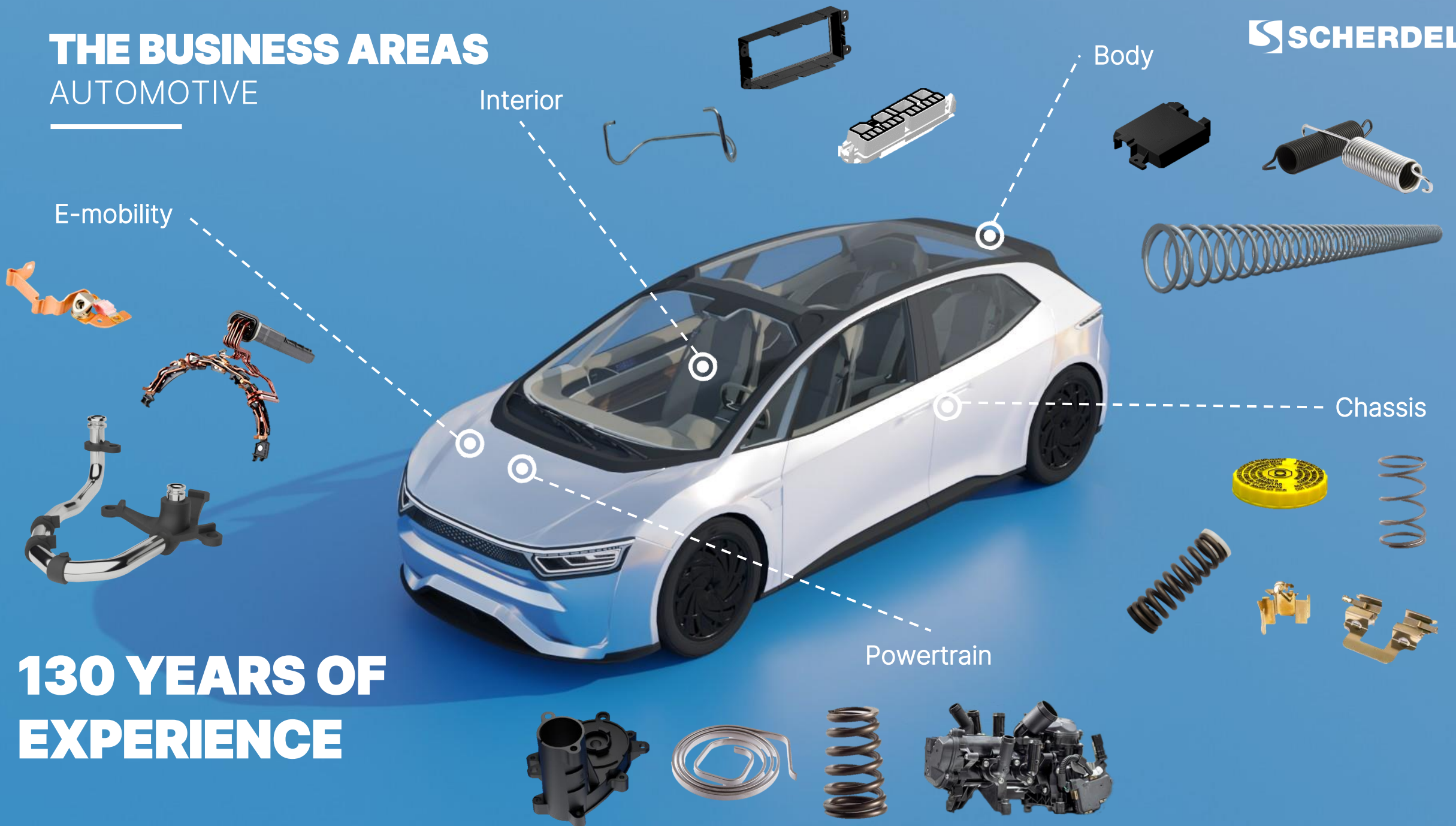


**CERTIFICATIONS**  
ISO 13485

# THE BUSINESS AREAS

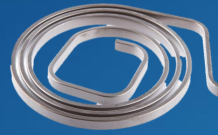
AUTOMOTIVE

**SCHERDEL**



**130 YEARS OF  
EXPERIENCE**





VCT



VALVE SPRINGS



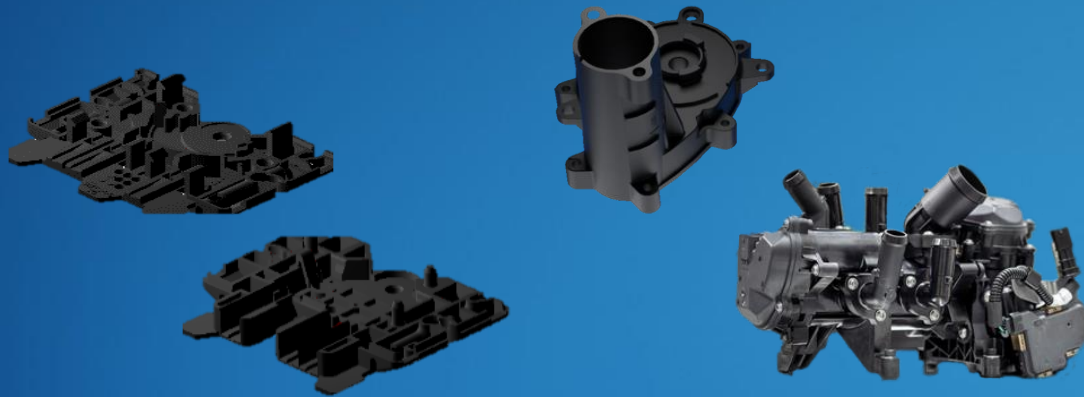
DAMPENING  
SPRINGS



POPPET  
VALVE



TORSION  
SPRINGS



HOUSING & COVER FOR  
FUEL SYSTEM

THERMAL  
MANAGEMENT  
MODULES



# POWERTRAIN

# POWERTRAIN

## VALVE SPRING

### MATERIAL

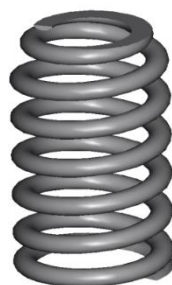
- ✓ Oil tempered wire

### APPLICATION

- ✓ Engine valves for in-take and exhaust system

### FEATURES

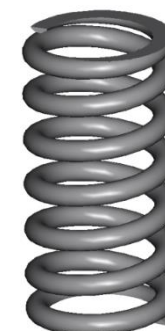
- ✓ Highly stressed compression springs
- ✓ Cylindrical, conical or beehive spring shape
- ✓ Variety of wire shapes (round, oval, multi-arc)
- ✓ Up to 500 million cycles lifetime
- ✓ SOF GSI process in-house
- ✓ Shot peening, grinding and hot setting
- ✓ Scherdel 100% automatic quality inspection
- ✓ Color marking



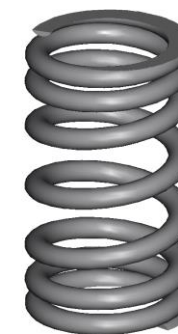
BEEHIVE



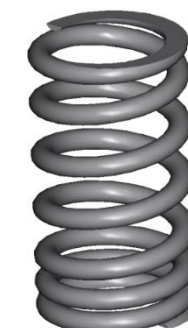
CONICAL



CYLINDRICAL



SYMMETRIC



ASYMMETRIC

# POWERTRAIN

## POPPET VALVE ASSEMBLY

### MATERIAL

- ✓ Oil tempered wire / Stainless steel

### APPLICATION

- ✓ Regulates oil pressure in system to facilitate gear changes and smooth operation

### FEATURES

- ✓ Highly stressed compression springs
- ✓ Semi and full automatic inhouse assemblies
- ✓ Assembly made with metal + plastic components
- ✓ Cap color identification for easy assembly
- ✓ Scherdel 100% automatic quality inspection

POPPET VALVE



TRANSMISSION  
VALVE BODY



COMPLETE TRANSMISSION  
ASSEMBLY



# POWERTRAIN

## VARIABLE CAM TIMING (VCT)



### MATERIAL

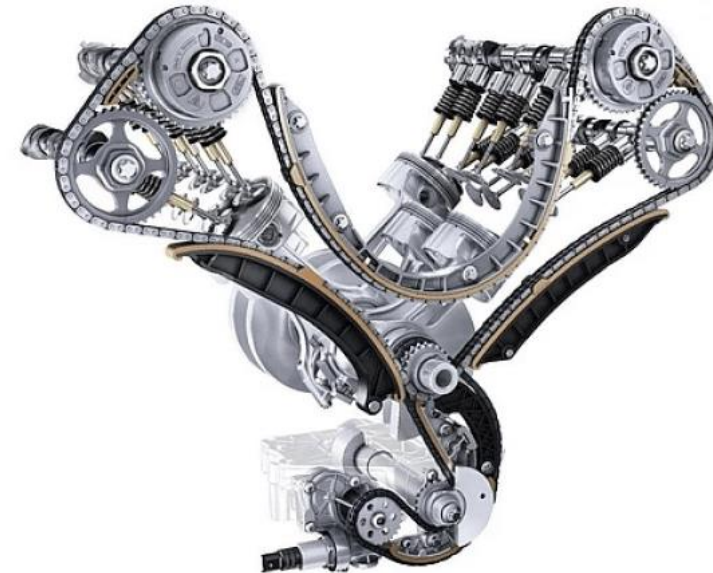
- ✓ Steel Wire

### APPLICATION

- ✓ Return Spring- Spiral Or Torsion
- ✓ Locking Pin Spring-compression
- ✓ Vane Seal-Leaf Spring

### FEATURES

- ✓ Scherdel 100% automatic quality inspection
- ✓ Stress relief / Shot peening & Demagnetize
- ✓ Optimally designed for high dynamic loads



# POWERTRAIN

## HOUSINGS & COVERS FOR FUEL SYSTEMS



### MATERIAL

- ✓ POM

### APPLICATION

- ✓ Fuel pump systems (level monitoring and functional components)

### FEATURES

- ✓ Special raw material resistant for operating inside of gasoline and diesel tanks
- ✓ Plastic components operation under specific pressure of fuel
- ✓ Machine 220/260 ton.



# POWERTRAIN

## THERMAL MANAGEMENT MODULES



### MATERIAL

- ✓ PPS & PA9T

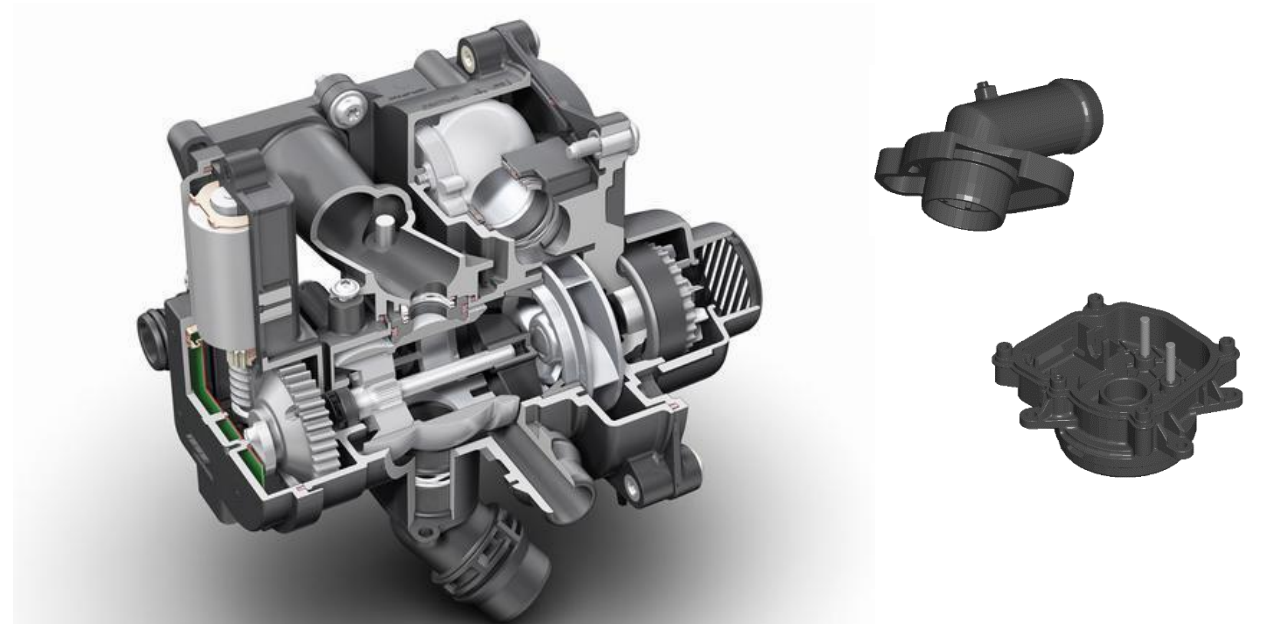
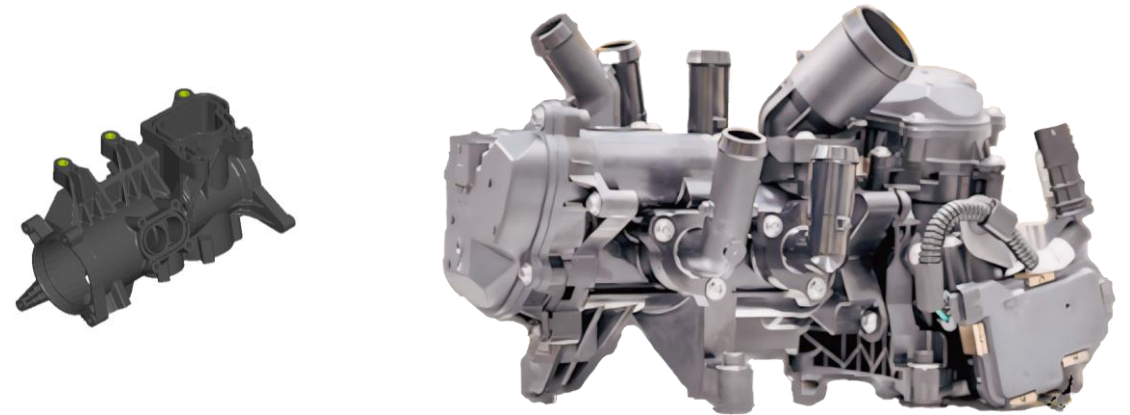
### APPLICATION

- ✓ Cooling systems for fuel engine, including different connectors and metal components over molded with plastic

### FEATURES

- ✓ Special resin for metal substitution
- ✓ Early development together with customer to find proper material on metal substitution
- ✓ Elimination of secondary operations, like welding, plastic part produced directly from injection tool
- ✓ Machine 220/260/400 ton.

### COOLING SYSTEMS

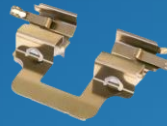




DOUBLE  
BODY  
TENSION  
SPRING



BRAKE  
PAD CLIP



BOOSTER  
SPRING



SMALL  
TENSION  
SPRING



REBOUND  
SPRING



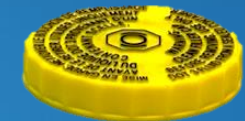
CONTROL  
HOUSING



FLOATS



BRAKE  
RESERVOIRS



FILLER CAPS



# CHASSIS

# CHASSIS

## REBOUND SPRING

### MATERIAL

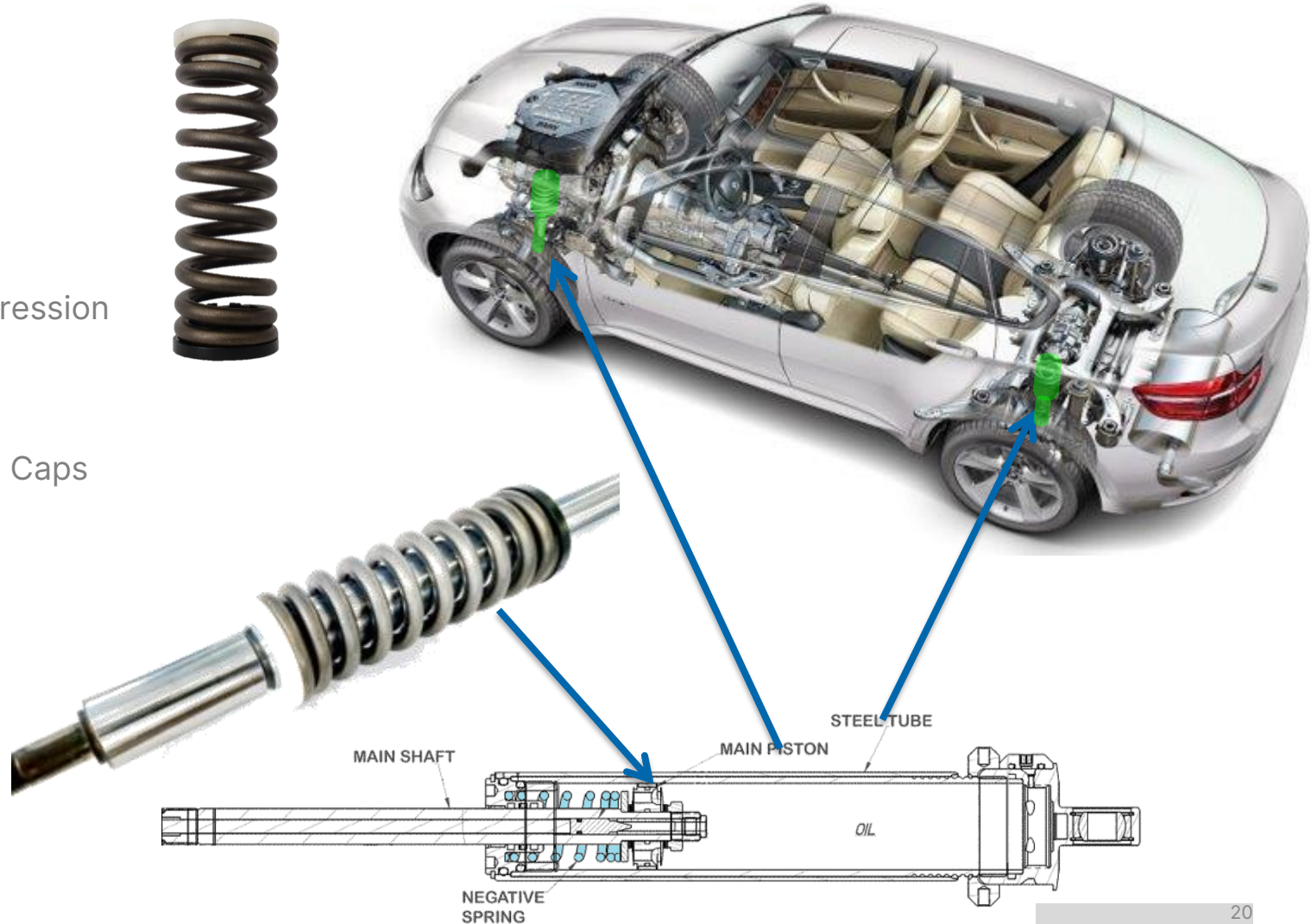
- ✓ Oil tempered wire

### APPLICATION

- ✓ Inside the suspension damper
- ✓ Main function: Absorb energy during the compression (Rebound) movement

### FEATURES

- ✓ Semi and full inhouse automatic assembly with Caps
- ✓ Up to +400K cycles with 70% of stroke
- ✓ Scherdel 100% automatic quality inspection
- ✓ Inhouse cleaning process





# CHASSIS BRAKE PAD CLIP

## MATERIAL

- ✓ Stainless steel

## APPLICATION

- ✓ Secures and hold the brake pads and reduce pad rattles
- ✓ Pad separation

## FEATURES

- ✓ SCHERDEL has produced over 90 million pad clips for worldwide annually
- ✓ Complex geometry with relatively tight tolerance
- ✓ Bihler machine is up to more than 30 bending steps
- ✓ Complex continuous radial bends
- ✓ Feasible for special features (ex.180° bend)
- ✓ Special in-house VT600 coating (PTFE Based) with low COF and high durability



# CHASSIS

## DOUBLE BODY TENSION SPRING

### MATERIAL

- ✓ Oil tempered wire

### APPLICATION

- ✓ Drum-in-Hat / Parking & Emergency Brake

### FEATURES

- ✓  $\varnothing$  1.0mm -  $\varnothing$  4.8mm depending on spring index and pre-load
- ✓ Square wire is also possible
- ✓ Variety of hook shapes



# CHASSIS

## BRAKE FLUID RESERVOIRS & FILLER CAPS



### MATERIAL

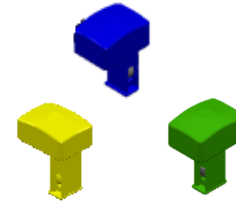
- ✓ PP

### APPLICATION

- ✓ Breaking System Components

### FEATURES

- ✓ Brake fluid reservoir as safety component
- ✓ Produced in two parts (upper & lower) + components assembly (Float, FLI, etc.)
- ✓ Secondary operations for welding and testing 100% to guarantee finished goods
- ✓ ESD handling for "Hall Sensors", used in autonomous cars
- ✓ Machine 220/300/400 ton.



# CHASSIS CONTROL HOUSINGS



## MATERIAL

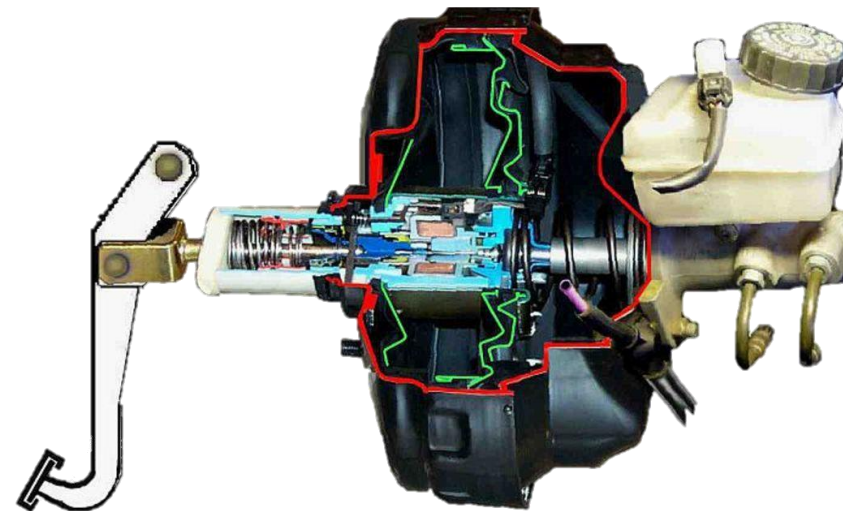
- ✓ PET-GF35

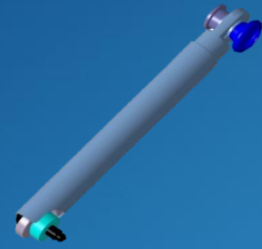
## APPLICATION

- ✓ Breaking System Components

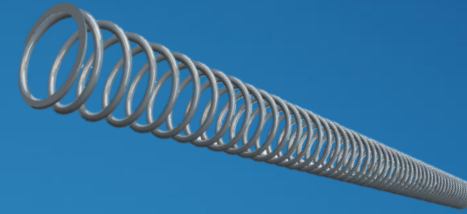
## FEATURES

- ✓ The heart of the brake booster
- ✓ Tight tolerancing product
- ✓ Plastic component does not need any secondary operation after injection molding, like some competitors (machining)
- ✓ Machine 220/260/300 ton.





TAILGATE  
ASSEMBLY



LONG  
COMPRESSION  
SPRING



ELECTRICAL  
HOUSINGS &  
COVERS



TENSION  
SPRING



# BODY

# BODY

## LONG COMPRESSION SPRING

### MATERIAL

- ✓ SVL 11-010 FD SiCrV H, Oil tempered Wire, Scherdel Standard similar to EN 10270-2

### APPLICATION

- ✓ Opening / Closing system for power liftgate

### FEATURES

- ✓ Support weight of liftgate
- ✓ Compensate weight for automatic closing
- ✓ Excellent corrosion resistance
- ✓ Noise avoidance solutions



## **BODY** **TAILGATE ASSEMBLY**

### **MATERIAL**

- ✓ SVL 11-010 FD SiCrV H, Oil tempered Wire, Scherdel Standard similar to EN 10270-2

### **APPLICATION**

- ✓ Opening/Closing system for power liftgate

### **FEATURES**

- ✓ 99% lifetime at compressed position
- ✓ 50k-100k cycles
- ✓ Complete Inhouse assembly
- ✓ Resist High forces - Low spring rate



# BODY

## DECK LID TENSION SPRINGS



### MATERIAL

- ✓ EN 10270-1 Music Wire / Patented cold drawn unalloyed spring steel wire (Z) (ZA)

### APPLICATION

- ✓ Support deck lid opening system in sedan cars. Tension springs can be used in manual and automatic power systems (spindle drive)

### FEATURES

- ✓ 99% lifetime at L2 position (extended position)
- ✓ 25k-50k cycles of durability
- ✓ Clip assembly, foam insert & PA coating for noise reduction





# BODY

## ELECTRICAL HOUSINGS & COVERS



### MATERIAL

- ✓ PP-TD40 & PBT-GF

### APPLICATION

- ✓ Housings & covers for electronic modules

### FEATURES

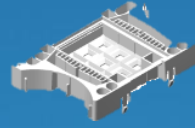
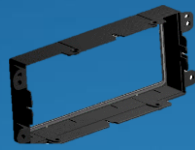
- ✓ Special flatness requirements
- ✓ Flame retardant requirements
- ✓ Metal or brass inserts over molded
- ✓ Surface finishing for labeling or DMC marking (Antennas/radar, Air Bag units or PCU's)
- ✓ Machine 220/260/300 ton.

### ECU MODULES





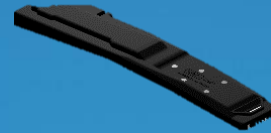
WIRE FORMS



CLUSTER &  
CENTRAL CONSOLE



GEAR HOUSINGS /  
COVERS



HVAC COMPONENTS & 2K COMPONENTS



# INTERIOR

# INTERIOR CLUSTER & CENTRAL CONSOLE



## MATERIAL

- ✓ PC, PBT-GF

## APPLICATION

- ✓ Functional plastics (central console, electronic panels & cluster)

## FEATURES

- ✓ Engineering raw materials for specific application on light conductivity
- ✓ Tight tolerances requirement for assembly
- ✓ Flame retardant & ESD protection
- ✓ Surface finish requirements
- ✓ Machine 160/220/260 ton.

## ELECTRONIC PANEL



# INTERIOR

## HVAC & 2K COMPONENTS

### MATERIAL

- ✓ ABS, PP+TPV & PC

### APPLICATION

- ✓ Air condition consoles & sealing components

### FEATURES

- ✓ Components with tight tolerances for assembly between
- ✓ 2K technology to produce parts out of 2 different components or different colors in one shot
- ✓ Components with surface A (appearance), special handling is needed after injection
- ✓ Machine 140/220/260/300 ton.

HVAC MODULES





POWER ELECTRONICS



ELECTRIC DRIVES



BATTERY SYSTEMS



THERMAL MANAGEMENT



# E-MOBILITY

## POWER ELECTRONICS



### MATERIAL

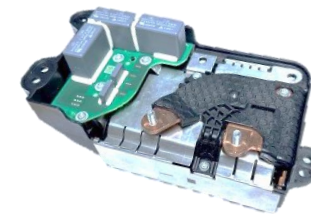
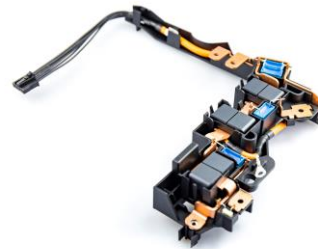
- ✓ Copper
- ✓ Aluminum
- ✓ PP

### TECHNOLOGY

- ✓ Stamping
- ✓ Bending
- ✓ Press Fit
- ✓ Laser, Resistance & Diffusion Welding
- ✓ Resistance Soldering
- ✓ Assembly
- ✓ Heat Stacking
- ✓ Gluing
- ✓ Injection Molding

### APPLICATION

- ✓ AC and DC connectors
- ✓ Over molded busbars
- ✓ Guided frames
- ✓ EMC filters
- ✓ Intermediate circuit capacitor busbars



# E-MOBILITY

## ELECTRIC DRIVES



### MATERIAL

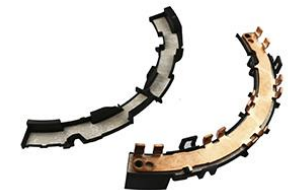
- ✓ Copper
- ✓ Aluminum
- ✓ PP

### TECHNOLOGY

- ✓ Stamping
- ✓ Bending
- ✓ Wire Forming
- ✓ Press Fit
- ✓ Laser, Resistance & Diffusion Welding
- ✓ Resistance Soldering
- ✓ Assembly
- ✓ Heat Stacking
- ✓ Gluing
- ✓ Injection Molding

### APPLICATION

- ✓ Busbar assemblies
- ✓ Connection rings for E-Motors
- ✓ Power Connectors / Over molded Busbars
- ✓ Copper Wire Forms for E-Motors
- ✓ Media-tight Stator Connectors



# E-MOBILITY

## ELECTRIC DRIVES

### MATERIAL

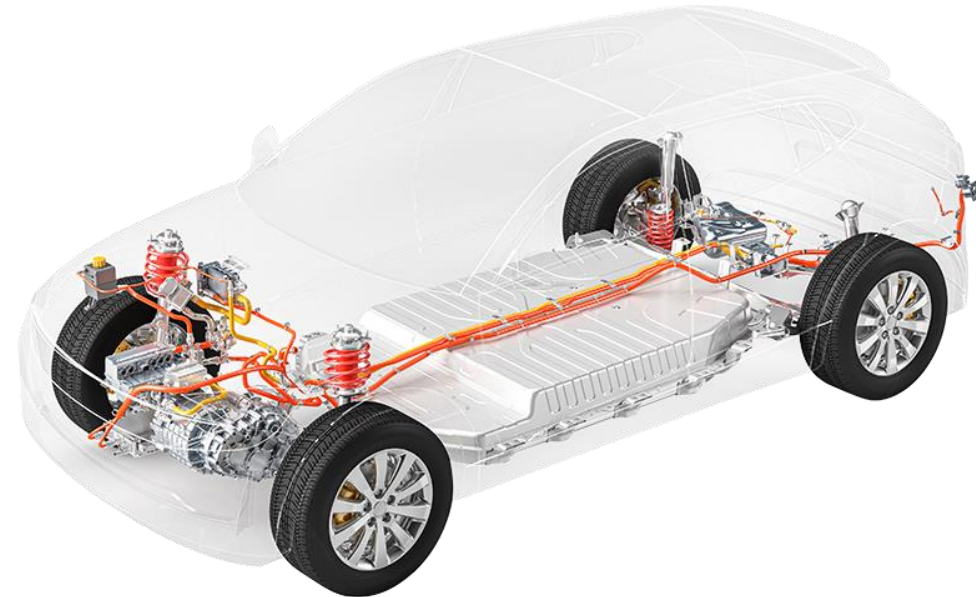
- ✓ Copper (with and without coating / Insulation)
- ✓ Aluminum
- ✓ PP

### TECHNOLOGY

- ✓ Stamping
- ✓ Bending
- ✓ Wire Forming
- ✓ Insulation Removal
- ✓ Press Fit
- ✓ Laser, Resistance & Diffusion Welding
- ✓ Resistance Soldering
- ✓ Assembly

### APPLICATION

- ✓ Busbar Assemblies
- ✓ Module Connectors
- ✓ Cell Connectors
- ✓ HV Busbars





# E-MOBILITY

## THERMAL MANAGEMENT



### MATERIAL

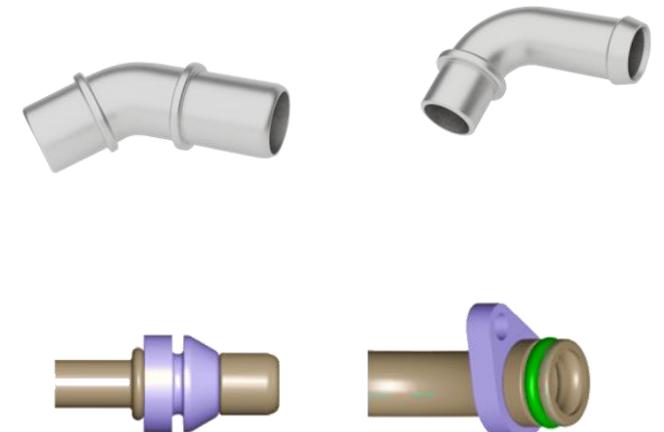
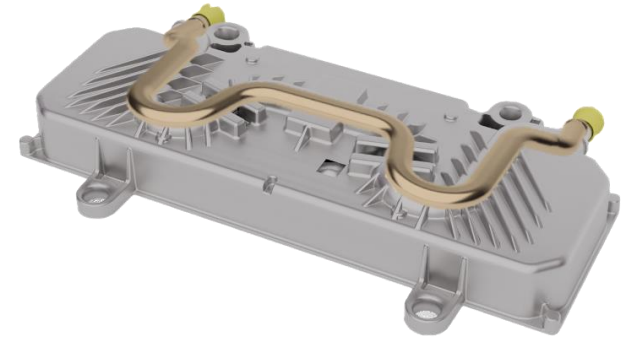
- ✓ Stainless Steel
- ✓ Aluminum
- ✓ PP
- ✓ Copper

### TECHNOLOGY

- ✓ Forming
- ✓ Bending
- ✓ Rolling
- ✓ Laser Welding
- ✓ Injection Molding
- ✓ Bond in Aluminum Cast Mold
- ✓ Pour in Aluminum Cast Mold
- ✓ Scherdel 100% automatic quality inspection

### APPLICATION

- ✓ Power Electronics
- ✓ Electric Drives
- ✓ Power Generator / Storage
- ✓ Climate, Heat pump & HVAC Systems



# OFFERED SOLUTIONS

COATING / CLEANING

# COATING SERVICE

## PRODUCT

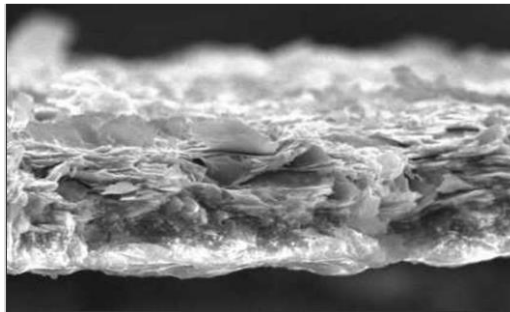
- ✓ Delta Protekt ® KL 100/120
- ✓ Delta Seal Silver GZ
- ✓ VL 440
- ✓ PTFE friction reduction coating

## APPLICATION

- ✓ Various shapes, sizes, and coating thicknesses available for protection
- ✓ Screws /Springs
- ✓ Stamping parts / Housings / Die-castings, etc...

## FEATURES

- ✓ Quality examinations: Salt Spray Test NSS, Condensed Air Test AHT, Coating Thickness



# CLEANING SERVICE

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## DEGREASING AND PRETREATMENT FOR COATING

- ✓ Surface treatment for delivered parts to clean the parts from oil, grease and other production residues
- ✓ The parts can be cleaned in baskets or racks according to the requirements
- ✓ Alcohol (SdM) / Water (SST) based cleaning process
- ✓ Possibility of cleaning small and sensitive to impact parts up to heavy and big parts

## APPLICATIONS

- ✓ Screws
- ✓ Springs
- ✓ Stamping parts
- ✓ Housings
- ✓ Die-castings, etc...



# MEDTEC

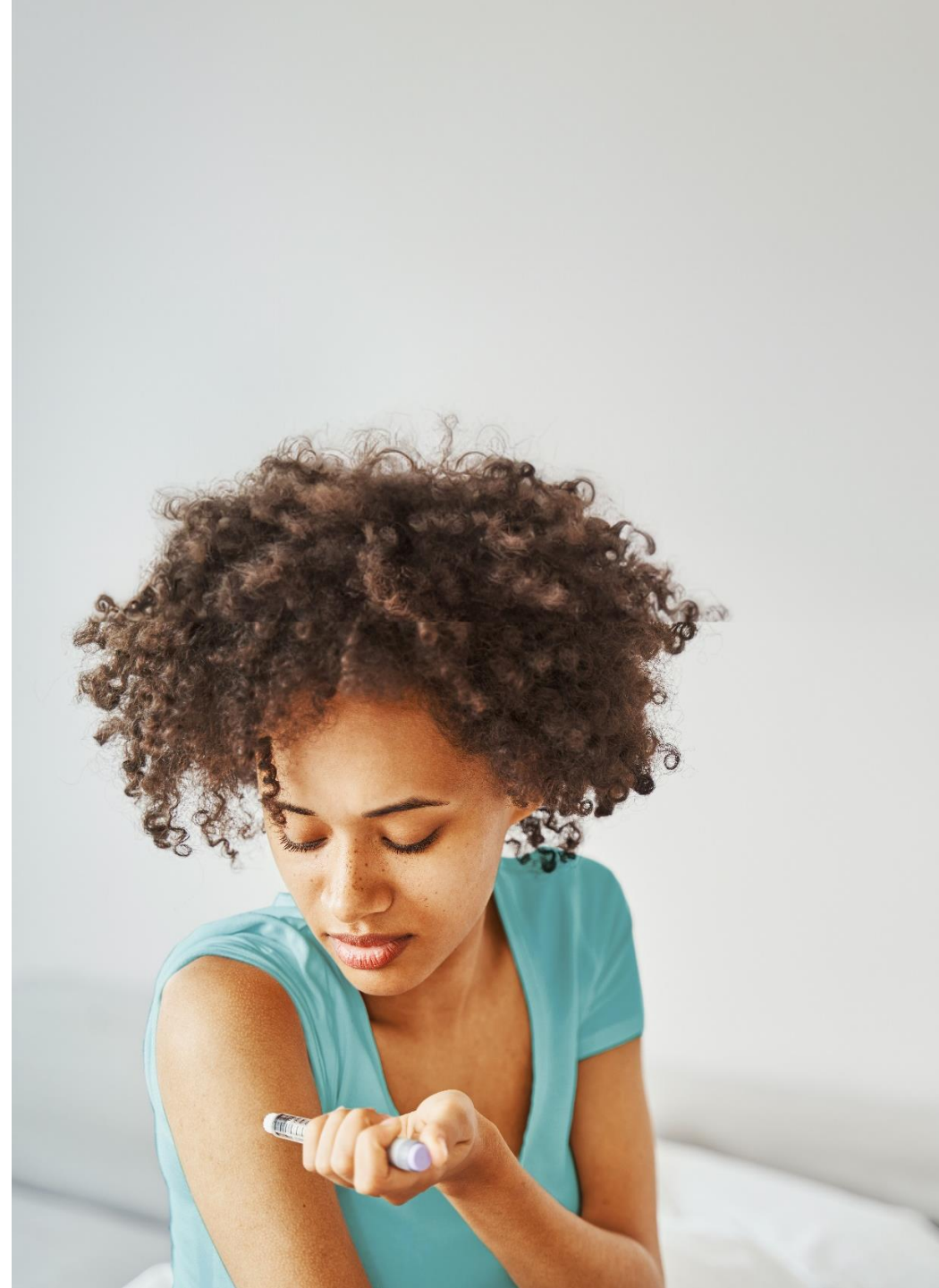
## SOLUTIONS FOR DELIVERY OF HIGH AND LOW VISCOUS DRUGS

### APPLICATION

- Insulin pens
- Auto injectors
- Inhalators
- Safety syringes

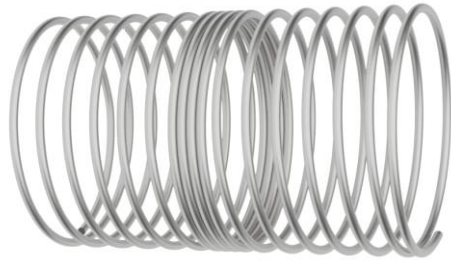
### PRODUCTS

- Compression springs
- Spiral springs
- Stamping and bending parts
- Wave springs
- Torsion springs
- Wire bending parts



# OUR PRODUCT RANGE

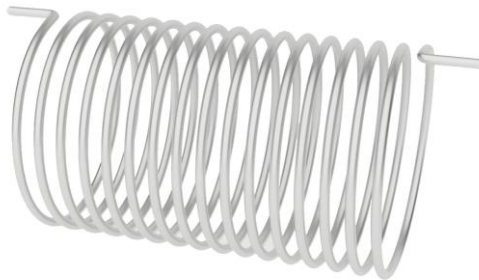
## SPRINGS WE SUPPLY



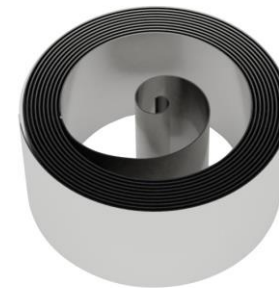
**COMPRESSION SPRINGS**



**STAMPING & BENDING PARTS**



**TORSION SPRINGS**



**SPIRAL, CONSTANT FORCE &  
POWER SPRINGS**

# WE CARE

“BECAUSE THERE’S A PERSON BEHIND EVERY COMPONENT WE MAKE”

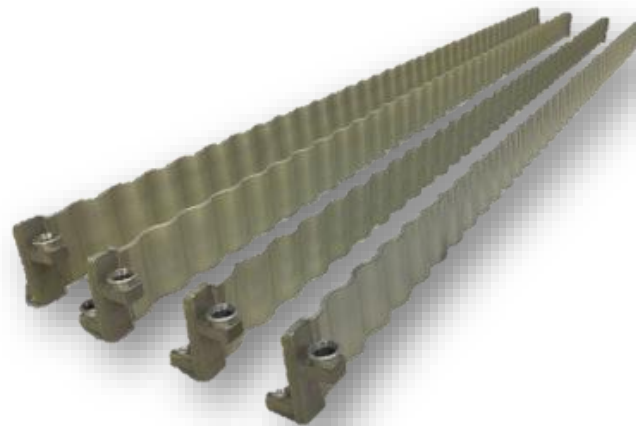


# XMAX-SCHERDEL DE MEXICO

## MAIN PRODUCTS



*Stamped cold plates*



*Cooling tubes*



*Microchannel cold plate*



# XMAX-SCHERDEL DE MEXICO

## MAIN PRODUCTS

### MATERIAL

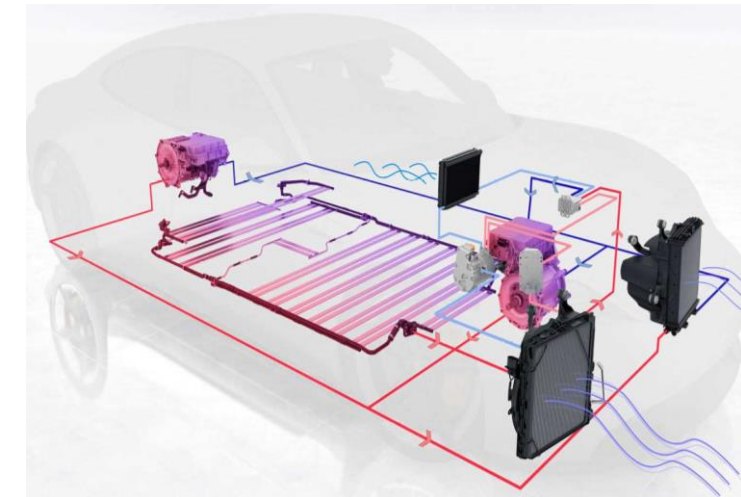
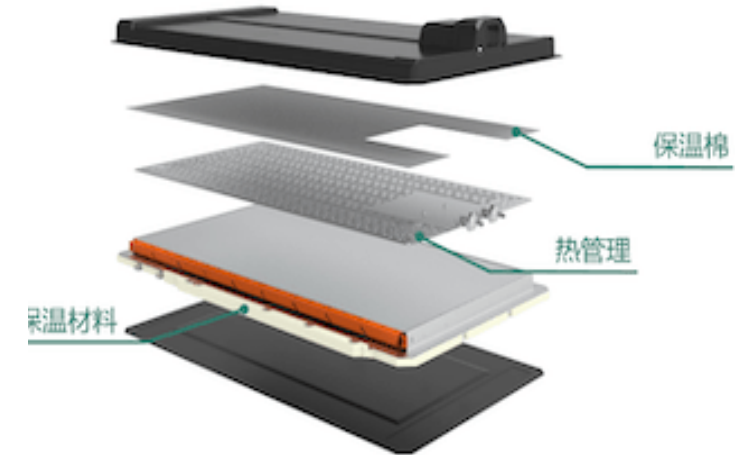
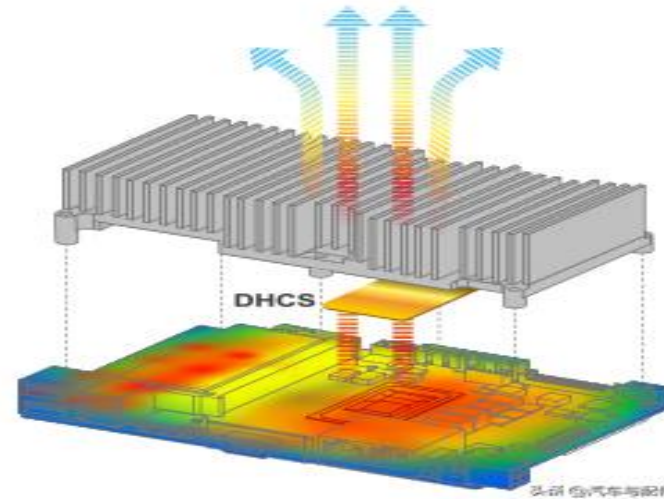
- ✓ Aluminum

### APPLICATION

- ✓ Thermal management component system solution provider
- ✓ Electric cell thermal management
- ✓ Electrical component thermal management
- ✓ Thermal management assembly components

### FEATURES

- ✓ Ensure the performance and cycle life of the battery
- ✓ Eliminate thermal runaway
- ✓ Guarantee the safety of the electric core



 **SCHERDEL**



**THANK YOU FOR YOUR ATTENTION**