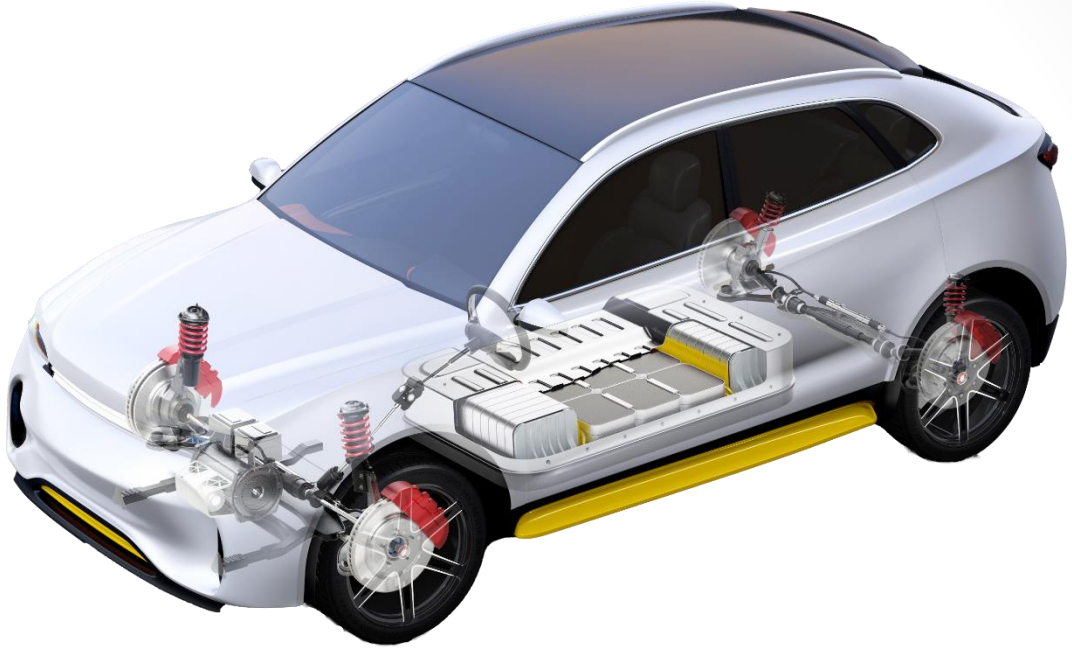


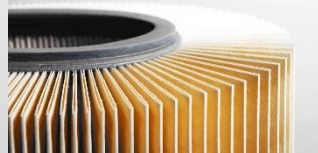
BATTERY BONDING

SOLUTIONS FOR BATTERY BONDING APPLICATIONS







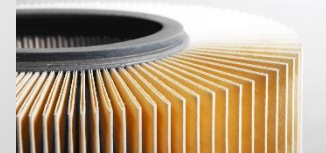
Agenda

1. About us
2. Cell types
3. Cell manufacturing
4. Module manufacturing
5. Battery pack manufacturing
6. Our technologies







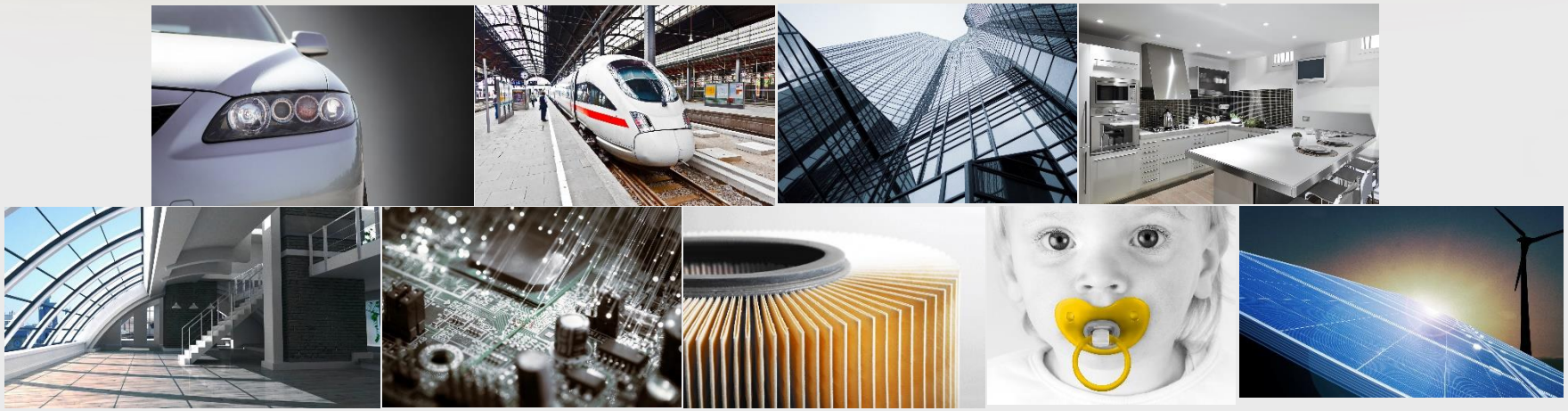



OUR CLAIM

WE ARE AN INNOVATIVE COMPANY FOR
THE PROCESSING OF LIQUID PLASTICS

OUR PROFESSION

WE ARE REPRESENTED IN MANY DIFFERENT MARKET SEGMENTS



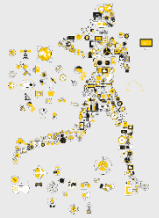
OUR VALUES

CUSTOMER-CENTRIC

ACCOUNTABLE

OPEN

PROGRESSIVE

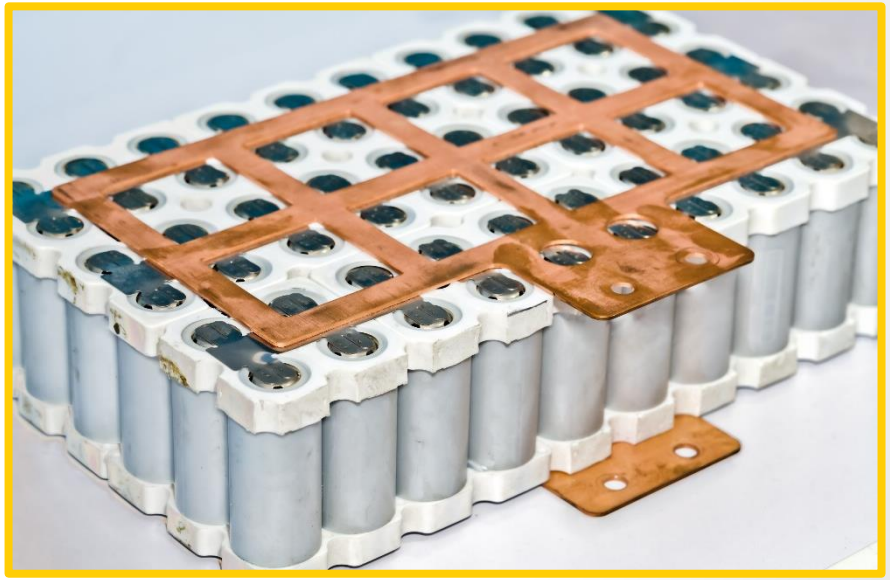


COOPERATIVE

WAGNER GROUP

Cylindric cells

- Mounted in units (up to 100 cells)
- Easy to manufacture
- Mechanical stability
- Recyclability

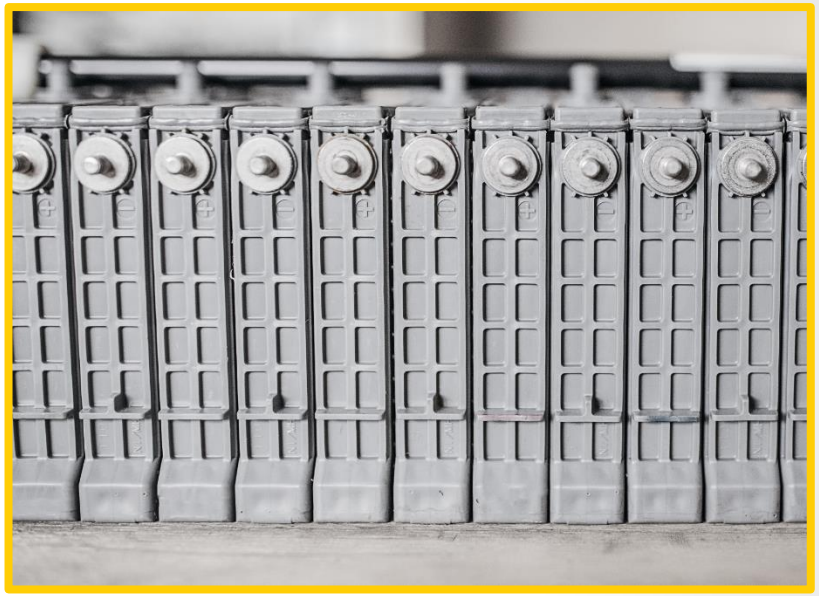


Pouch cells

- Soft outer shell
- Light and cost-effective
- Simple and efficient use of space

Prismatic cells

- Optimum use of space
- Mounted to blocks (9-18 cells)
- Good space utilisation and allow a flexible design



Cell manufacturing

Soft & Pouch Cells / Prismatic & Cylindric Cells

- **Assembly adhesive cell-to-carrier**
- **Assembly adhesive cell-to-cell**
- **Pole Sealing**

Assembly methods for cylindrical cells:

- **Flood:** material covers the entire floor of the cell
- **Strategic dots:** Small dots in certain patterns
- **Bead application:** A bead is placed around the internal diameter of the cell housing.

Assembly methods for square cells:

- **Beading:** Application of beads on square cell. Once placed in the battery pack, the beads are compressed. Therefore enlargement of bonding surface.
- **Encapsulation:** Cells placed into a battery pack, material applied or encapsulated whereby the cell is completely sealed

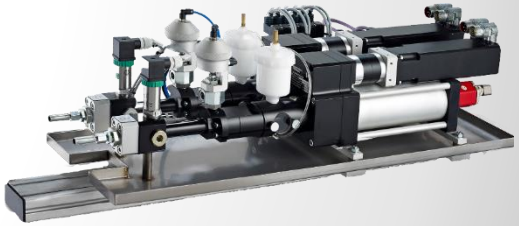
Common Materials used

- **Cylindrical Cells:** e. g. 1K epoxies, 2K epoxies, 1K UV curing materials, 2K silicones, 2K PU
- **Square cells:** e. g. 2K epoxies, 2K silicones, 2K PU

Our Solutions

- Vecdos eOne

- Vecdos eTwin



Module manufacturing

- **Liquid gap filler for thermal management**
  - Heat transfer between modules and battery cooling systems
  - Thermal conductivity
- **Battery assembly adhesives**
  - Temperature resistance, high elongation, fast curing
- **Thermal conductivity adhesive for thermal management**
  - Thermal management & structural fixation of modules to cooling plate or for battery cell assembly
  - Combination of thermal conductivity and high tensile strength; high elongation to overcome coefficient of thermal expansion

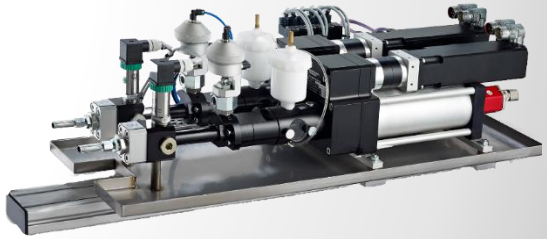
Common material used

- **Liquid gap filler for thermal management:** 2K materials
- **Battery assembly adhesives:** 2K materials
- **Thermal conductivity adhesive for thermal management:** e. g. 2K silicone or 2K PU

Our Solutions

- Vecdos eOne

- Vecdos eTwin



Battery packs
Battery Pack & Integration

- **Liquid gap filler for thermal management**
  - Heat transfer conductive
- **Thermal adhesive for thermal management**
- **Battery assembly adhesives**
  - Assembling the modules
  - Bonded together to reduce vibration problems
  - Sealed to prevent corrosion issues
- **Methods of battery bonding:**
  - **Bead:** precise application to the face of each module, arranged side by side, pressing beads
  - **Flood:** Material on the base of the pack to bond the modules
- **Cover sealing**
  - **Sealants** applied on battery cover or tray
- **Methods for cover sealing:**
  - **Bead** completely surrounding the battery module
  - **Bead** between a top and bottom cell module

Common materials used:

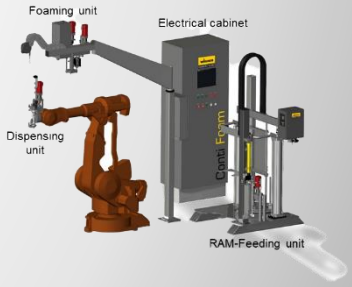
- **Liquid gap filler for thermal management:** e. g. silicones, PU
- **Thermal adhesive for thermal management:** e. g. silicones, PU
- **Battery assembly adhesives:** 2K materials
- **Battery bonding:** 1K and 2K materials, e. g. epoxies
- **Cover sealing:** 1K and 2K materials, e. g. PU, 2K silicone, epoxies

Our Solutions

- Vecdos eOne

- Vecdos eTwin

- Conti Foam



WAGNER
REINHARDT-TECHNIK

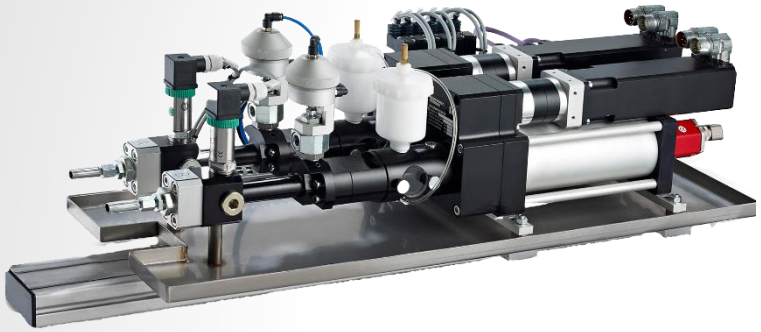
Vecdos eONE

- **1K-Shot Metering unit**
  with servo-drive for highly precise and reproducible metering applications

Technical data

- **Shot size:** 1,2 – 571 cm³/shot
- **Max. output/flow rate:** 2.000 cm³/min
- **Material pressure:** up to 300 bar
- **Material application:**
  - Dot
  - Encapsulation
  - Bead (geometry depending on material)

Vecdos eTwin

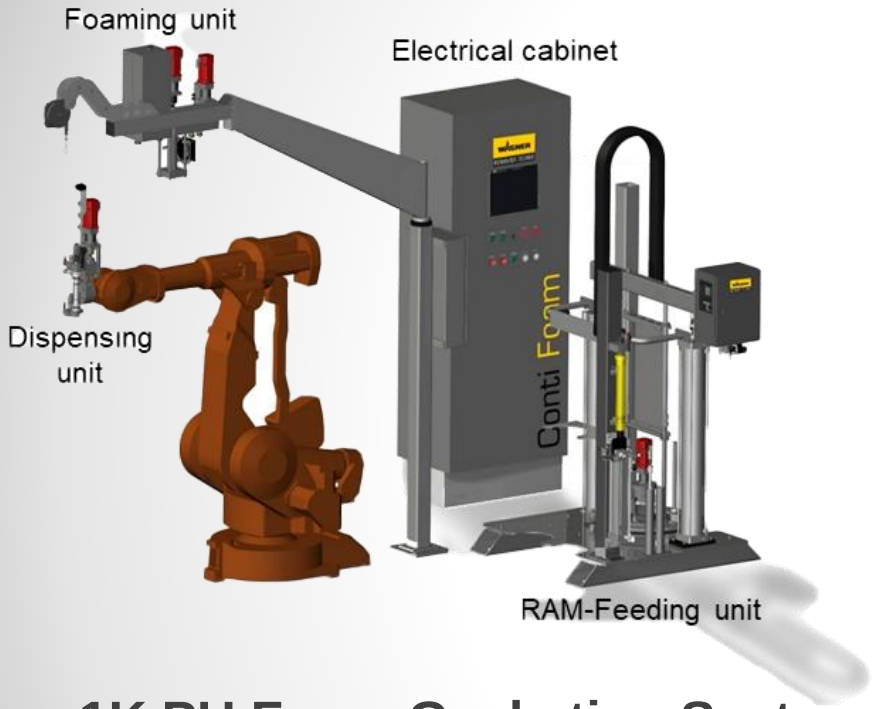


- **2K-Shot Metering unit**
  with independent servo-drives for highly precise and reproducible metering applications, flexible mix ratio

Technical data

- **Shot size:** 1,2 – 571 cm³/shot
- **Max. output/flow rate:** 2 x 2.000 cm³/min
- **Material pressure:** up to 300 bar
- **Mixing ratio:** 1:1 – 100:2
- **Material application:**
  - Dot
  - Encapsulation
  - Bead (geometry depending on material)

Conti Foam



- **1K PU Foam Gasketing System**

ContiFoam is a compact, flexible system for economic processin of high-performance, closed cell foam gaskets

Technical data

- **Dosing output/flow rate:** 0,5 – 3 g/s
- **Material application:** common foam bead cross section up to 7 mm height
- **Speciality:** Physical foaming through metered inline gas injection offers highest quality with closed cell structure

WAGNER
REINHARDT-TECHNIK

WE ARE YOUR GLOBAL PARTNER

BENEFIT FROM OUR MANY YEARS OF EXPERIENCE

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