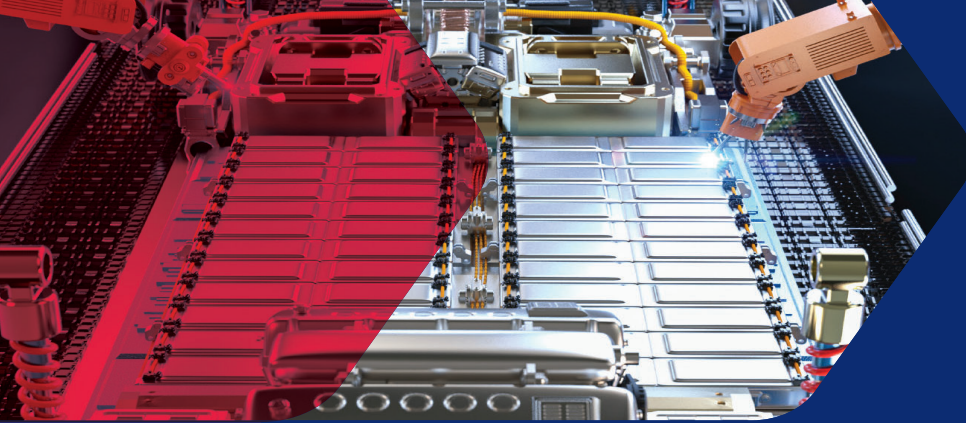




INDUSTRIAL BATTERY ASSEMBLY SOLUTION

BATTERY SEALING SYSTEM



DMTS E-Mobility line up

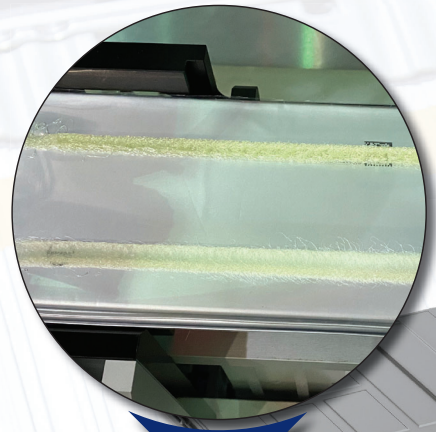
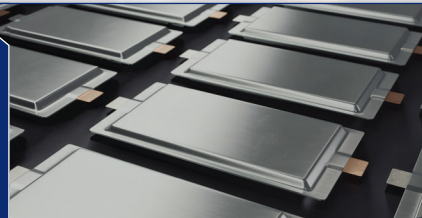
Pouch Cell

Hotmelt

Cell - Slip Prevention

2K Gap Filler

Cell to Module Case & Pack
Thermal dissipation/Adhesion



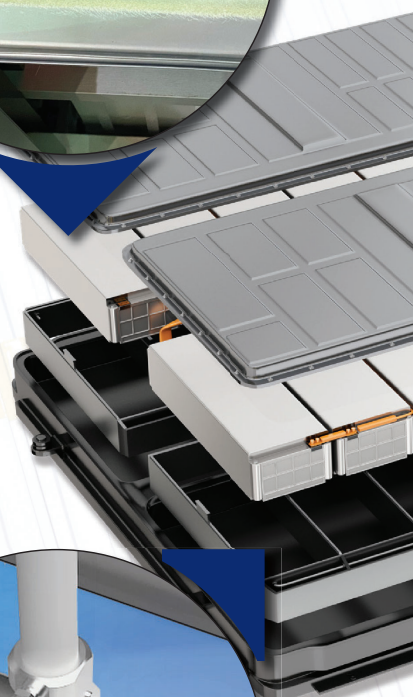
Prismatic Cell

2K Gap Filler

Cell - Slip Prevention
Cell to Module Case & Pack
Thermal dissipation / Adhesion

2K Potting

Cell - Insulation / Watertight/
Airtight / Corrosion prevention



Cylindrical Cell

2K Gap Filler

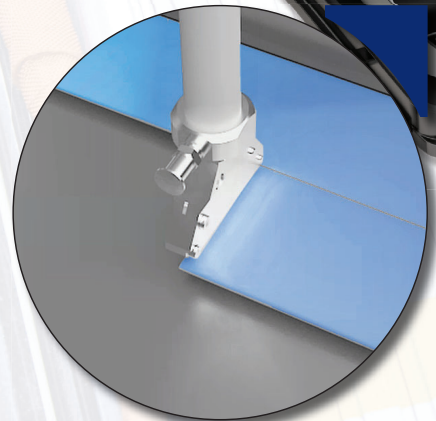
Cell - Thermal dissipation/Adhesion

2K Potting

Cell / Module Apply on top of module
Insulation / Watertight / Airtight /
Corrosion prevention

2K Sealing

Bus bar/Cell/Wire - Adhesion / Fixing



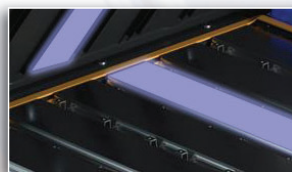
Battery assembly solutions **for multiple industries**

In the E-mobility market, high-voltage battery packs require high performance, durability and stability, and the performance of the sealing application suitable for the battery manufacturing process will increase the satisfaction of meeting requirements and improving productivity.

With precise control sealing application technology that meets the special requirements of battery pack manufacturing and efficient battery manufacturing process design solution, DMTS is a strategic partner for E-mobility.

A battery pack, one of the important parts of an electric vehicle, is a representative heat generating component, and low thermal management in repeated charging and discharging is a very important factor for battery performance and lifespan.

Module & Pack Cover



2K Sealing

Cover - TPP-Thermal Propagation Prevention)delay

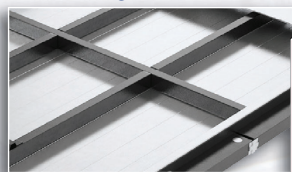
Pack



2K Sealing

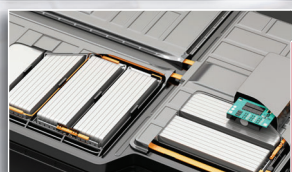
Pack Frame - Insulation/watertight / Airtight / Adhesion

Battery Case/Module/Pack



2K Gap Filler

Bottom of Module - Thermal dissipation
Bottom of Pack - Thermal dissipation



2K Gasket Foaming

Pack Cover - Watertight / Airtight

DMTS E-Mobility Configuration

In battery pack manufacturing (EV&ESS), the demands for performance, safety, durability, and securing battery life will continue to rise. Precise control, mixing method and mixing ratio of liquid materials used for purposes such as heat dissipation, watertightness, airtightness, and adhesion are key factors.

Application type by material

Material	Purpose of use	Features	Mixing type
Gap Filler	Thermal transfer	Main material : Silicon, Polyurethane, Etc. Viscosity : Similar to Resin/hardener Curing : Mixed natural curing/Heated proprietary curing Mixing ratio : Similar to Resin/hardener Curing feature : soft curing/elasticity	Static Mixing
Potting target material	Thermal transfer/ Adhesion	Main material : Polyurethane/Silicon Viscosity : Big difference in Resin/Hardener Curing : Mixed natural curing/Heated proprietary curing Mixing ratio : Resin/hardener mixing ratio is different Curing feature : Hard curing	Static Mixing Power Mixing Dynamic Mixing
Foam Gasket	Gasket	Main material : Polyurethane Viscosity : Big difference in Resin/Hardener Curing : Mixed natural curing/Heated proprietary curing Mixing ratio : Resin/hardener mixing ratio is different Curing feature : High foaming rate, elasticity after foaming	Dynamic Mixing

Material use/characteristics/application method is data from DMTS tests, and may vary depending on the manufacturing method and physical properties of the material, and it is possible to respond with a combination of three application methods.



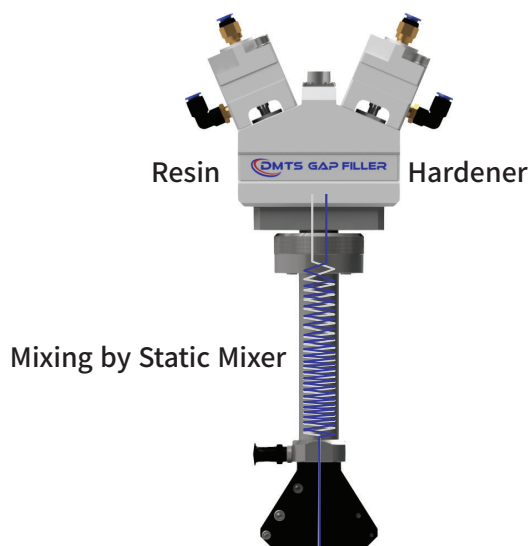
Cooling prevents overheating and maintains battery performance



Solid to avoid loss of performance when assembling the battery, and can be efficiently disassembled for future repairs

Differences in Material Mixing Type

Static Mixing

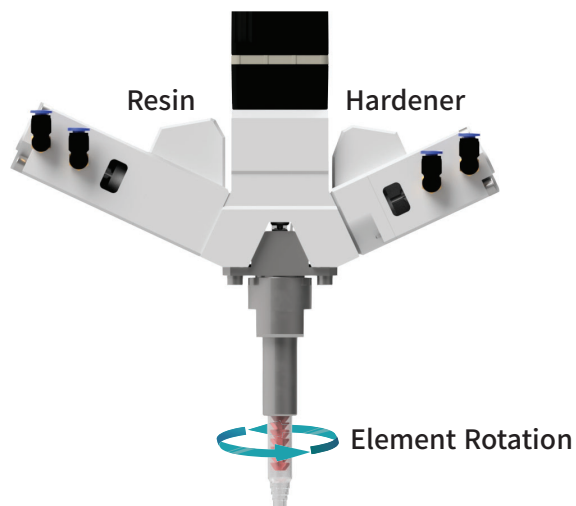


Mixing type - Mixing by pressure of precise control unit

Features

- The mixing ratio of resin/hardener is similar
- Mixer specifications determined by flow rate
- Mix according to the quantity of elements in the mixer
- Possible material even with low mixing ratio

Power Mixing

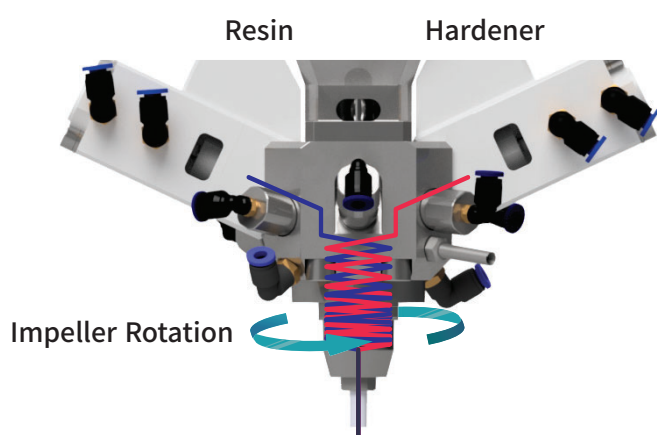


Mixing type - Pressure of precise control unit + Element rotation

Features

- Materials with different mixing ratios of resin/hardener
- Mixer specifications determined by flow rate
- Mixing according to element quantity + rotation
- Materials with moderate mixing ratio
- Element low speed rotation

Dynamic Mixing



Mixing type - Pressure of precise control device_impeller rotation

Features

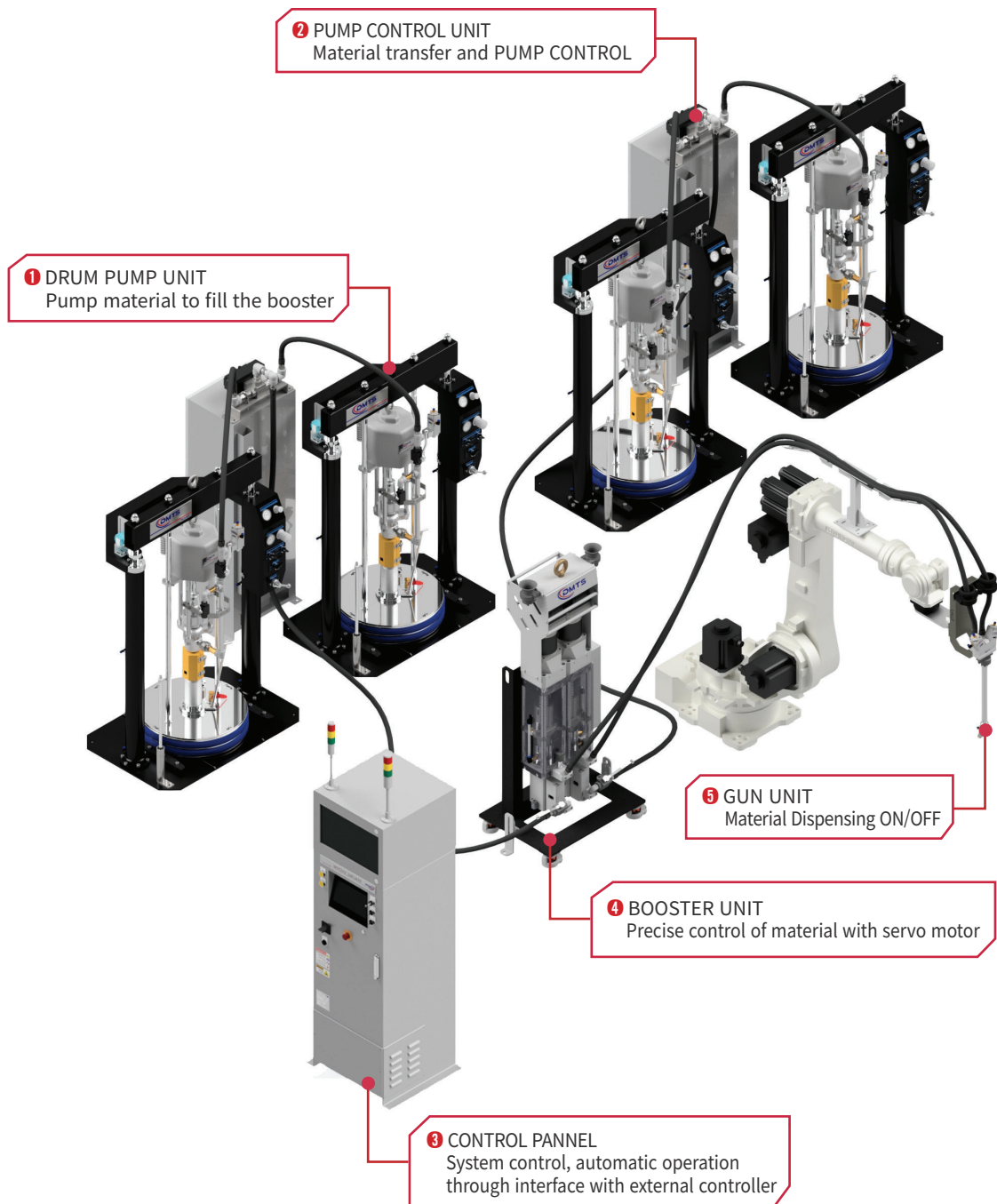
- Materials with different mixing ratios of resin/hardener
- Materials with important mixing ratio
- Impeller high-speed rotation

GAP FILLER SEALING SYSTEM

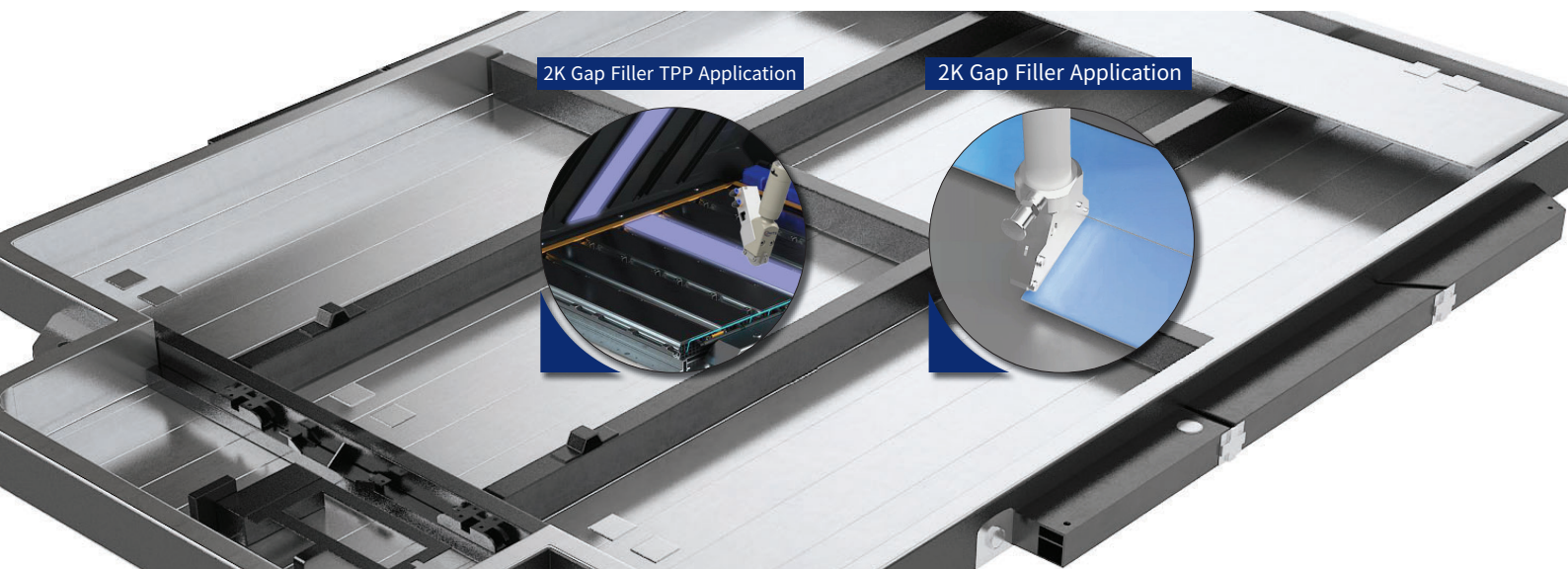
Gap Filler Sealing System

Considering the characteristics of the Gap Filler material, it is possible to extend the life of the equipment and improve productivity by applying a wear-resistant design and applying a function to prevent material sticking through the overall pressure control of the pipeline. It provides solutions that meet customer needs and high productivity, such as shortening C/T, with various types of pattern application, such as line application and surface application (20mm ~ 200mm).

System Lay-out



Battery Module & Pack Application



This is a process that uses the Gap Filler Sealing System to apply two-component materials such as Gap Filler and Thermal Adhesive in a precise and uniform manner for the purpose of heat dissipation, adhesion, and buffering of battery cells.

Various Nozzles

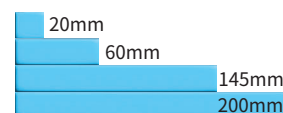


- Line application and surface application available
- Surface application (20mm ~ 200mm)
- Precise application accuracy $\pm 1\%$ guaranteed

Extrude Type



20mm~200mm SHOVEL NOZZLE



TPP NOZZLE



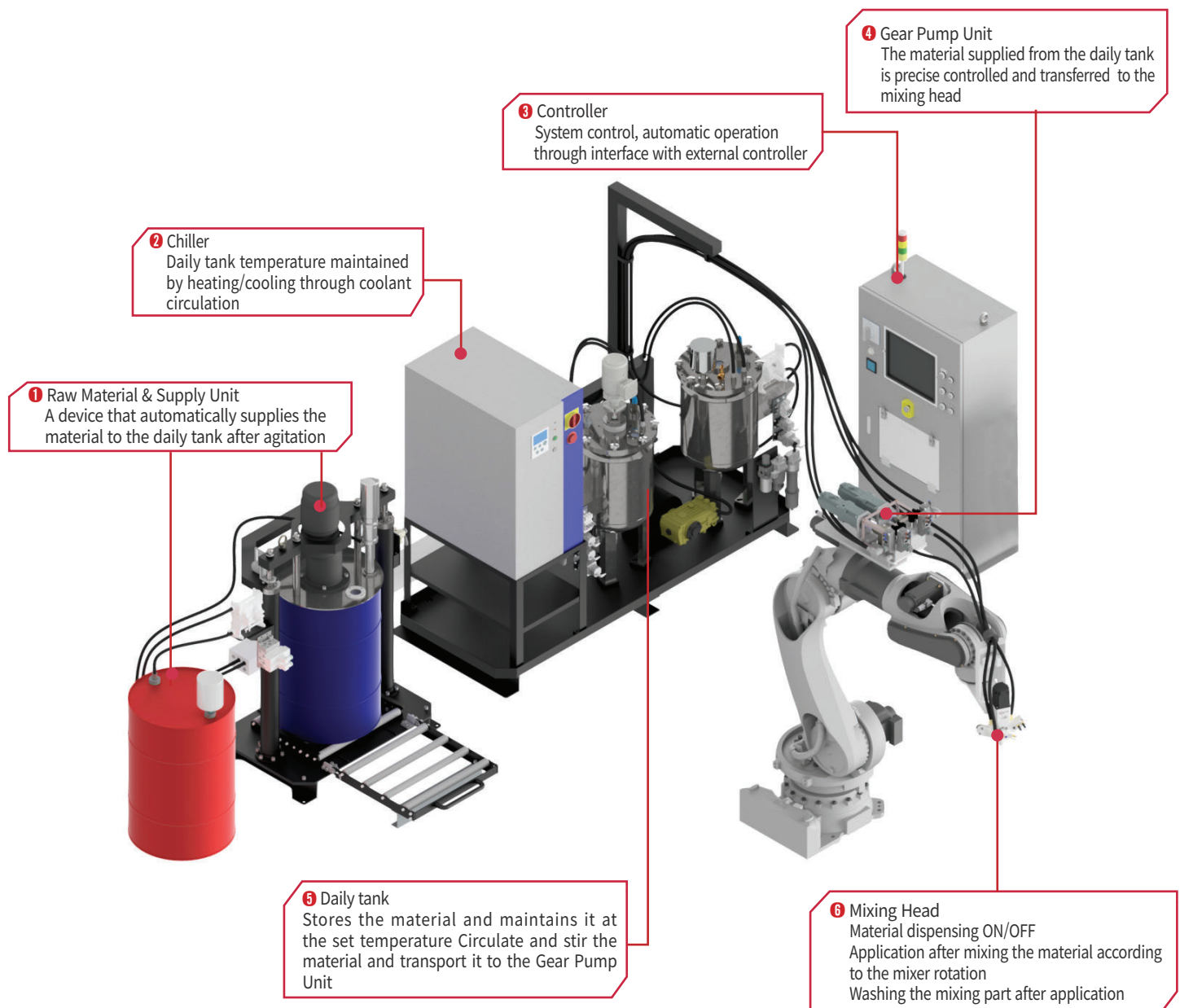
2K FOAMING / POTTING SYSTEM

2K Foaming / Potting System

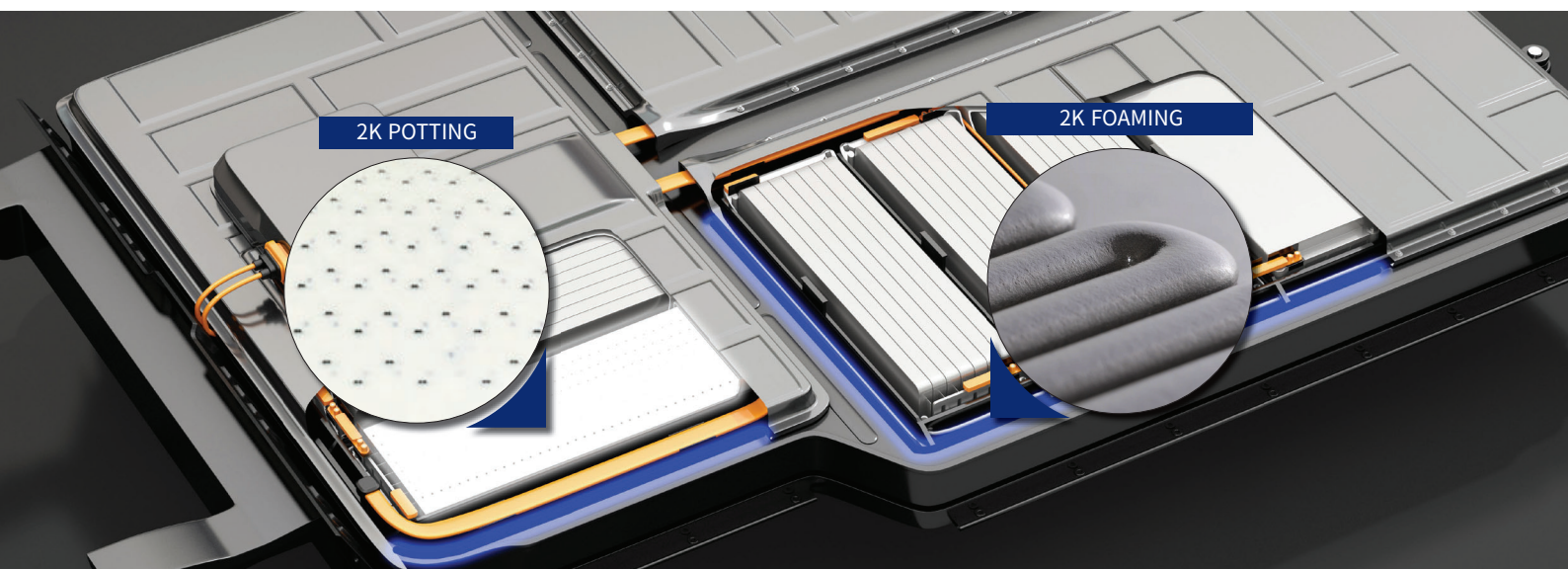
Considering the rapid hardening, foaming and sedimentation characteristics of foaming/potting materials, productivity can be improved by minimizing downtime such as mixer replacement by applying agitation, sedimentation prevention circulation and washing functions.

Depending on the variety of materials, it is possible to provide the optimal solution that meets customer needs by combining precise control units and changing the structure of the mixing head.

System Lay-out



Battery Pack Application



2K Foaming system application

- Labor cost reduction and quality improvement through automation
- Reduction of material cost (cheaper and longer life compared to existing gaskets)
- Applicable to various parts through automation

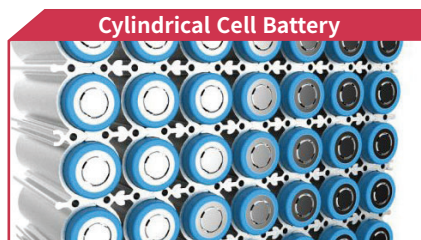
2K Potting system application

- Protects the assembly inside the battery pack and increases electrical insulation
- Precise control of application, mixing ratio, and degree of mixing

Various Application



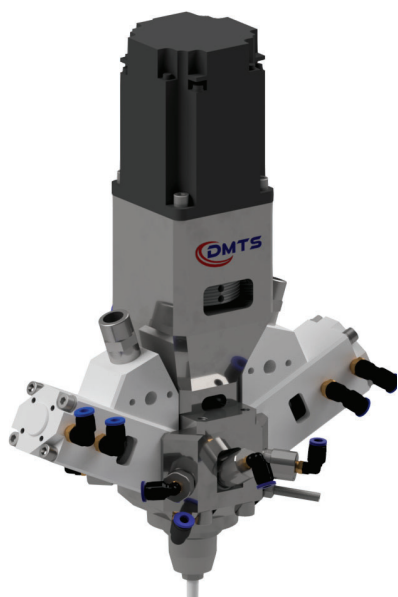
EV Battery Cover



Cylindrical Cell Battery



Door Inner Module



Before application on Cylindrical Cell Battery



Immediately After Application



After Potting Application



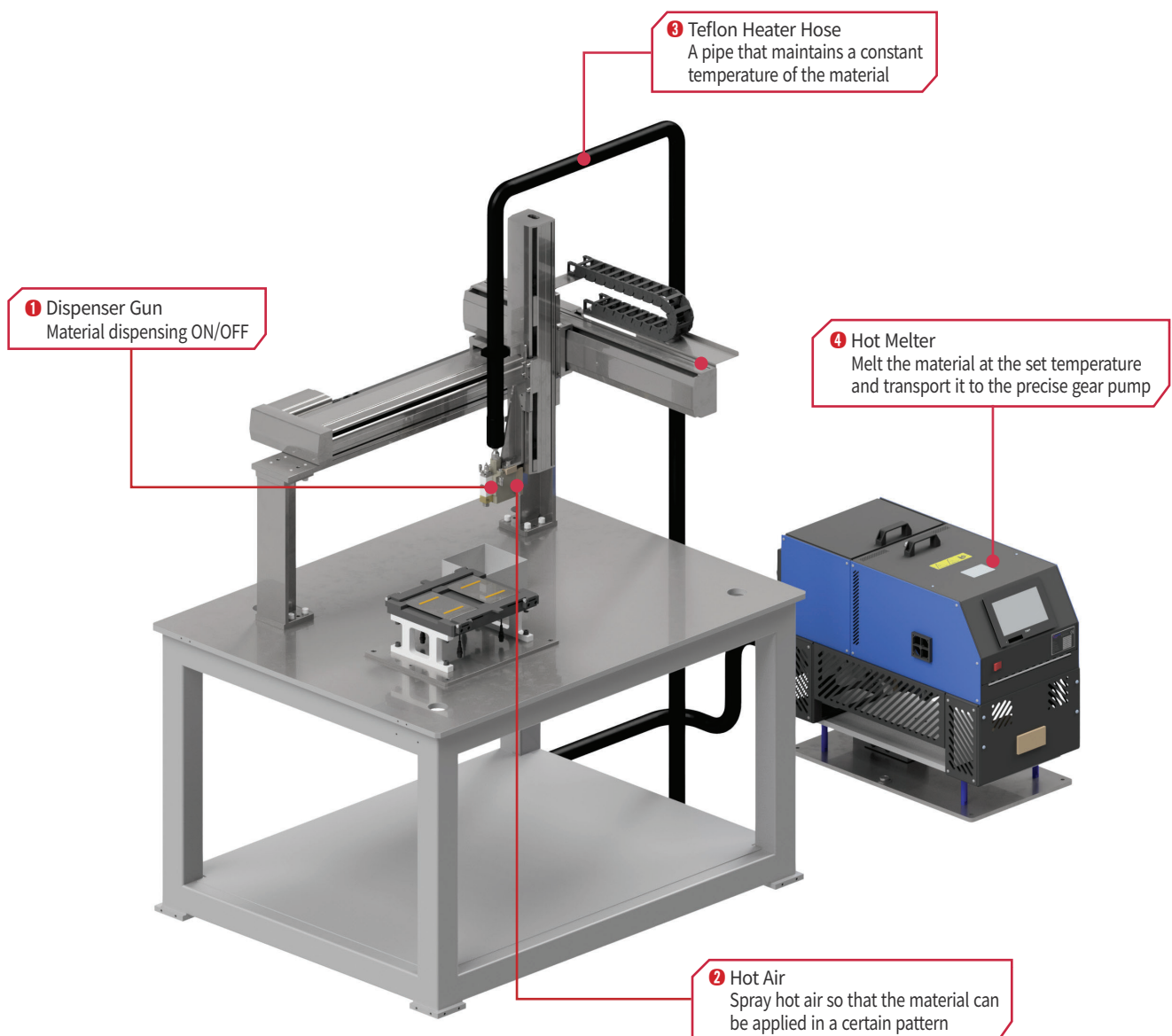
Time After Application

HOT MELT Sealing System

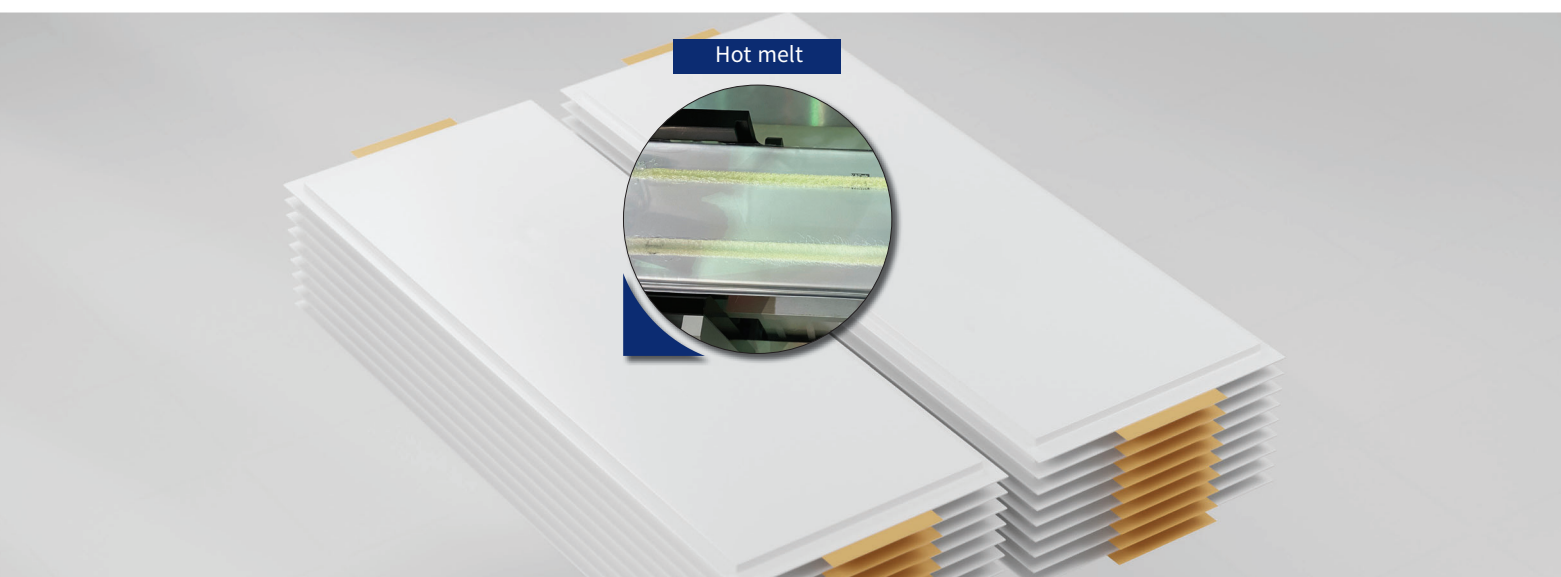
Hot melt Sealing System

It is solvent-free, non-volatile, non-flammable, thermoplastic resin that is 100% solid at room temperature, harmless to the human body, eco-friendly, and has no fire hazard. It is a hot melting type adhesive that cools/solidifies within seconds after being applied to an adherend in a liquid state at high temperature and pressed, and exhibits adhesive strength. Compared to solvent-type and water-soluble adhesives, it is possible to work at high speed as the time to complete adhesion is faster, and the characteristics of the material can be improved. It is possible to provide various solutions that meet customer needs through considered line application, spray application, and swirl application technology.

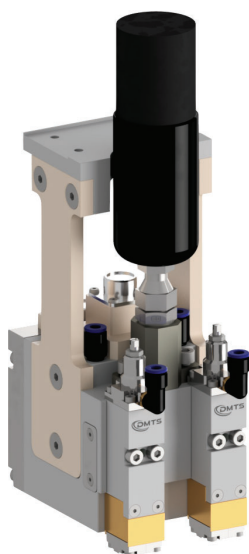
System Lay-out



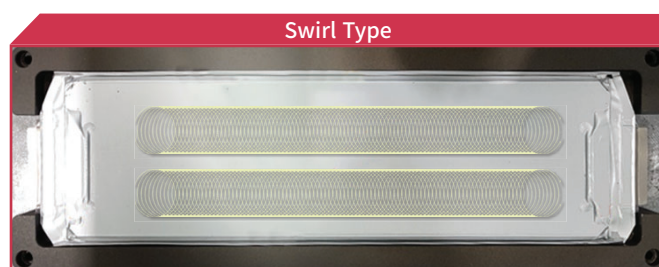
Battery Cell Application



Hot melt Types and Uses



Battery Cell Hot Melt Application



POLYMER	Uses
EVA (Ethylene Vinyl Acetate)	As a representative hot melt adhesive, it is mainly used for box packaging or general adhesive sealing.
Rubber	Due to its excellent tack, it is mainly used in fields related to nonwoven (sanitary field), film paper, and textile fabrics.
Polyurethane (Poly Urethane Reactive, Moisture curing urethane hot melt)	It has excellent solidity, elasticity, heat resistance and weather resistance, and is mainly used for bonding rubber and metal, shoe soles, textiles, wood, and plastics. Due to its excellent physical properties as a moisture-curing type, its use is rapidly increasing in recent years.
Polyester	Due to its excellent tack, hardness and heat resistance, it is recently used for hot melt molding and is used in various other
Polyamide	Due to its excellent tack, hardness and heat resistance, it is recently used for hot melt molding and is used in various other manufacturing process related fields. When special conditions are required, it exhibits high performance, such as heat resistance and oil resistance.



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