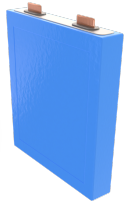
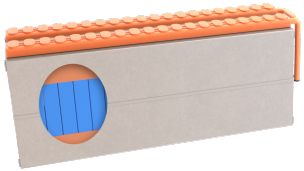
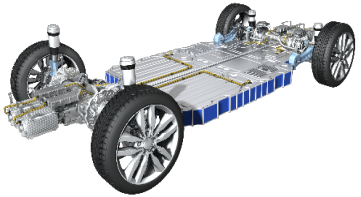
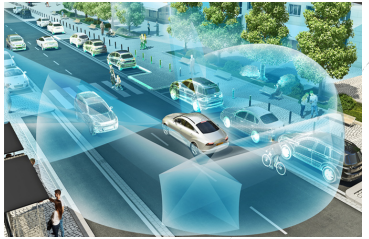
PPG Solutions for Mobility

We protect and beautify the world









PPG: More than 47,000 employees protecting and beautifying our world

A global maker of paints, coatings, and specialty materials

A leader in all our markets: construction, consumer products, industrial and transportation markets and aftermarkets

Headquartered in Pittsburgh, Pennsylvania, with operations in more than 70 countries

Founded in 1883

Fortune 500: Ranked 205

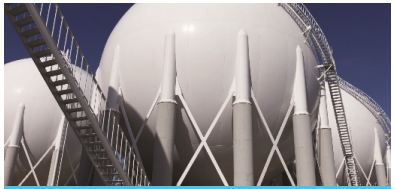
Two product segments drive our $15.4B business

Performance Coatings: 59%

Aerospace

Architectural Coatings**

Automotive Refinish Coatings



Protective and Marine Coatings

Industrial Coatings: 41%

Automotive OEM Coatings

Industrial Coatings

Packaging Coatings

Specialty Coatings and Materials

Innovation by the Numbers

> 3% sales ~ $500 million	annual R&D Investment
3500+	technical employees at more than 100 locations
32%	of sales from sustainable products, 60% increase since 2012
40% of Sales	2025 target for total sales from products or processes that improve sustainability

Coatings Enable Protection & Beautification + E-Mobility

First Layers

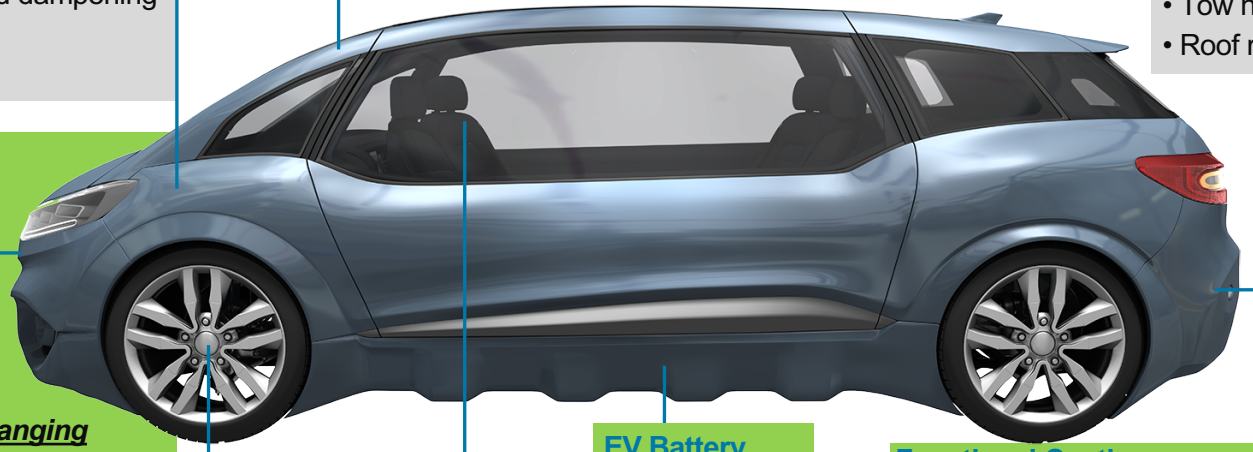
- Pretreatment
- Electrocoat
- Primer
- Basecoat
- Clearcoat
- Adhesives and Sealants
- Liquid-applied sound dampening

Specialized Autonomous Driving Equipment

- Light detection and ranging active
- Easy-clean sensors
- Radar compatible

Automotive Parts And Accessories

- Wiper arms
- Running boards
- Bumpers
- Tow hitches
- Roof racks



Decorative Automotive Parts and Accessories

- Bumpers
- Mirror Housings
- Handles
- Trim

Existing Content is Changing

Suspension

- Coil springs
- Shock absorbers
- Control arms
- Brake systems
- Underbody parts
- Wheels

Interiors

- Instrument panels
- Interior panels/trim
- Entertainment consoles
- Interior displays
- Durability, cleanability

EV Battery

- Battery Cell
- Adhesives and Sealants
- Dielectric
- NVH
- Fire Protection

Functional Coatings For Sensors and Antennas

- Antiglare lenses
- Easy-to-clean lenses
- Conductive inks
- Passenger classification
- Flexible heating
- Control panels
- Self-dimming mirrors
- Radio frequency interface shielding

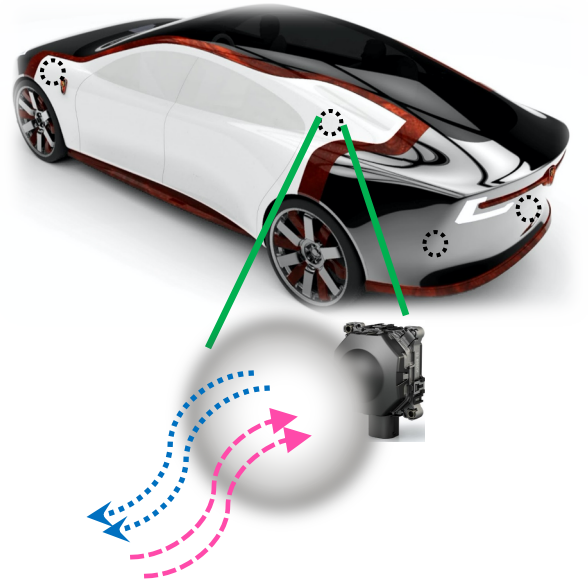
3 Examples of PPG Coatings Enabling Sensor Performance

LiDAR wavelengths

Colors naturally absorb/reflect

PPG Coatings Improve "Visibility" Of Dark Colors

Radar wavelengths



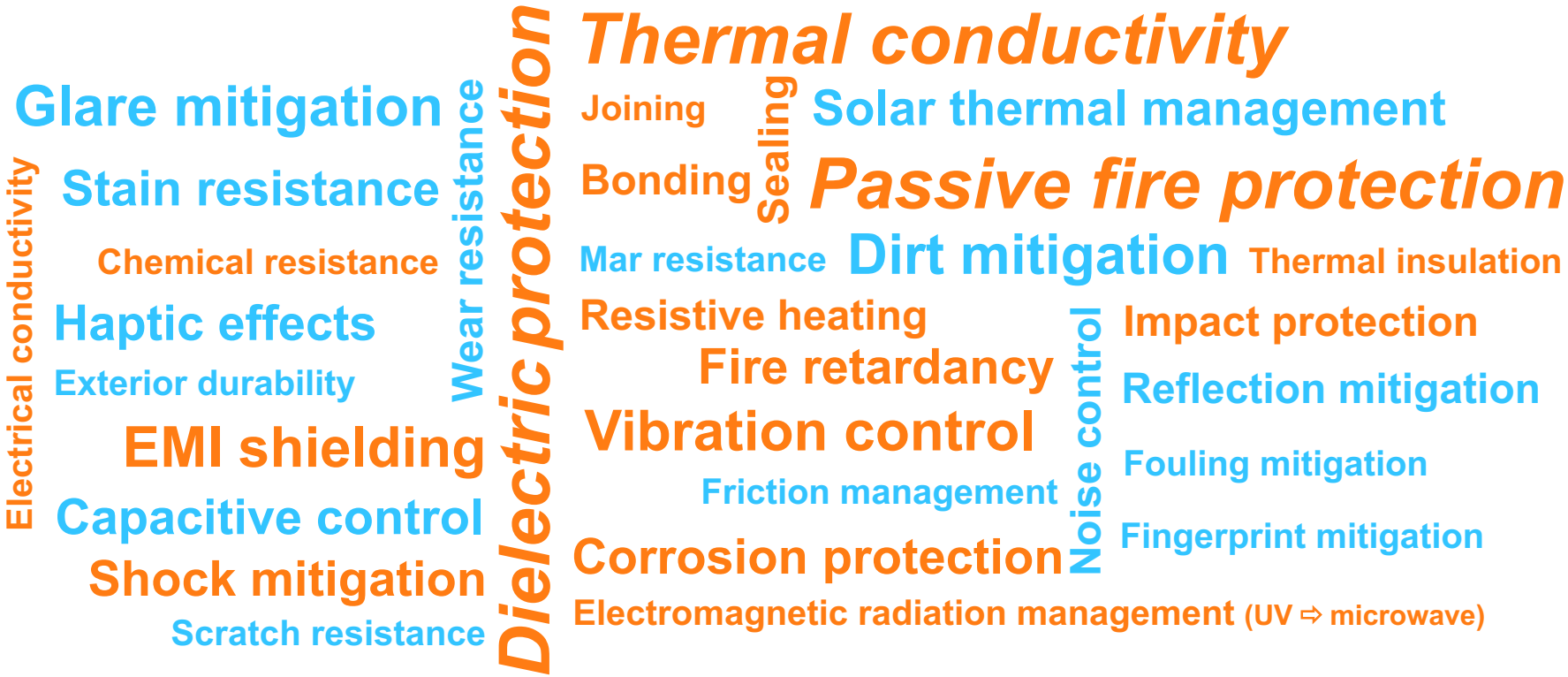
PPG Coating Minimize 2-way Signal Loss

Obstructed lens & housing

Nature always a factor

Coatings keep interfaces clean, Allow reliable sensor signal transfer

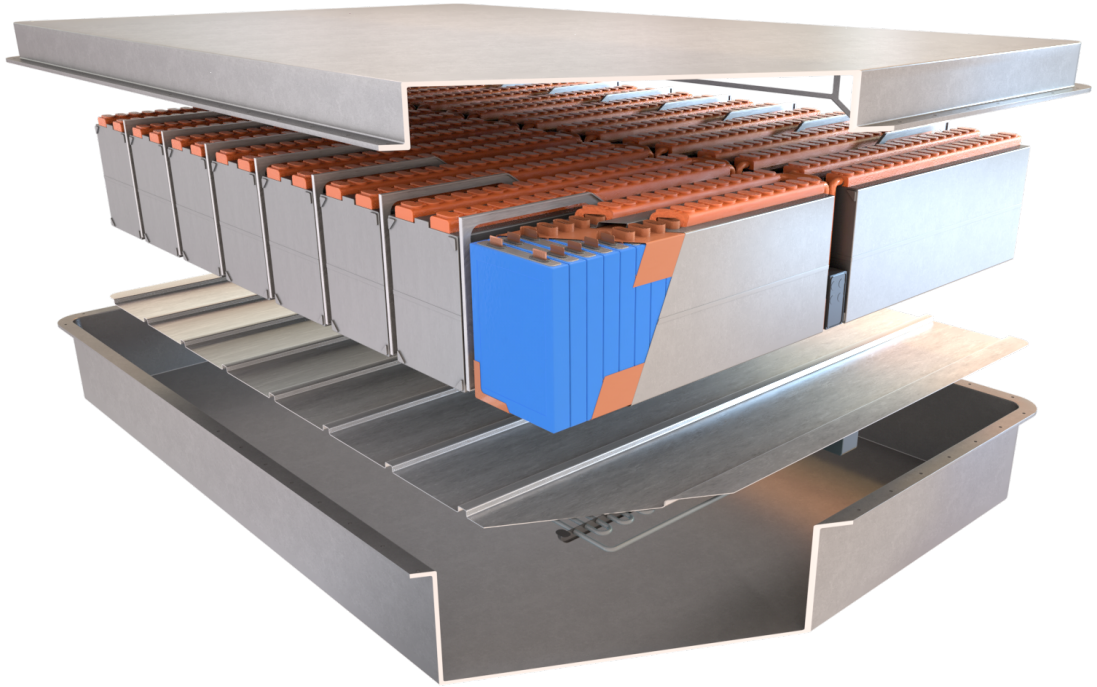
Common functional challenges we address….



…. <u>can impact battery pack design, safety & performance</u>

Solutions for Li Ion Batteries

- Solutions for the electrodes
  1. NMP free cathode binder
  2. Graphene systems
- Solutions for the pack assembly
  1. Corrosion and impact
  2. EMI/RFI shielding
  3. Bonding and sealing
  4. Dielectric isolation
  5. Fire protection
  6. Thermal conductivity

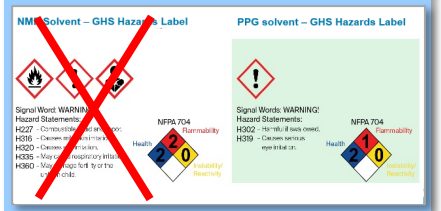


PPG coatings and materials can solve major challenges – solutions enabling performance, durability, safety, and cost

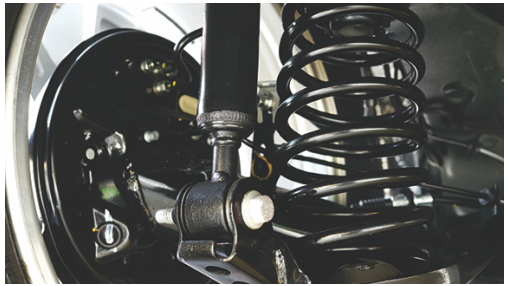
Lithium Ion Battery Cells –
PPG's Electrode Binder Solution Delivers Value Benefits for Change

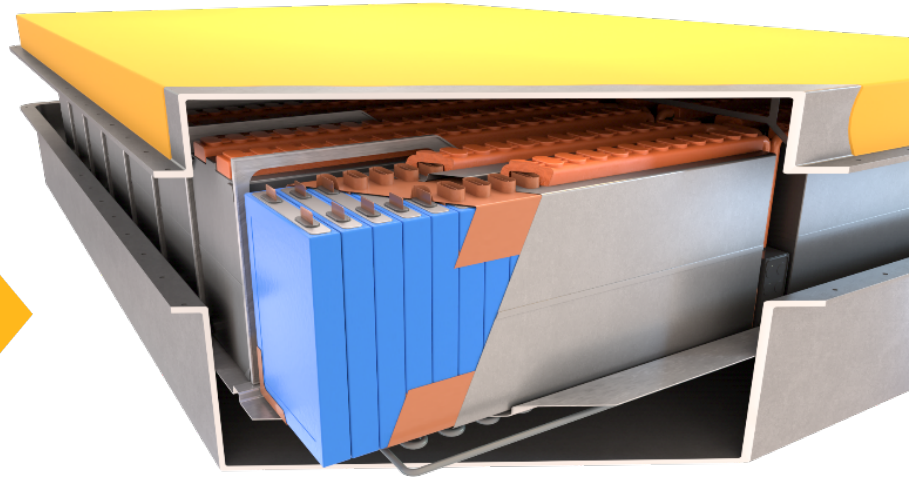
Safety, Cost, Performance

Formulation Safety, Global Compliance	Electrode Manufacturing Costs	Battery Cell Design Flexibility	Battery Cell Performance
Solventborne NMP Free	Higher Solids More Cells per Batch Less Solvent Recovery Shorter Mix Times Longer Pot-life	Power & Energy Density Thicker, Flexible Film Builds Lower Impedance	Uniform Binder Distribution Better Cycle Life



Corrosion: Leveraging a legacy to protect the battery assembly





Proven approaches for the harshest body & underbody applications adapted for various EV design scenarios

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Dielectric materials used throughout the pack assembly

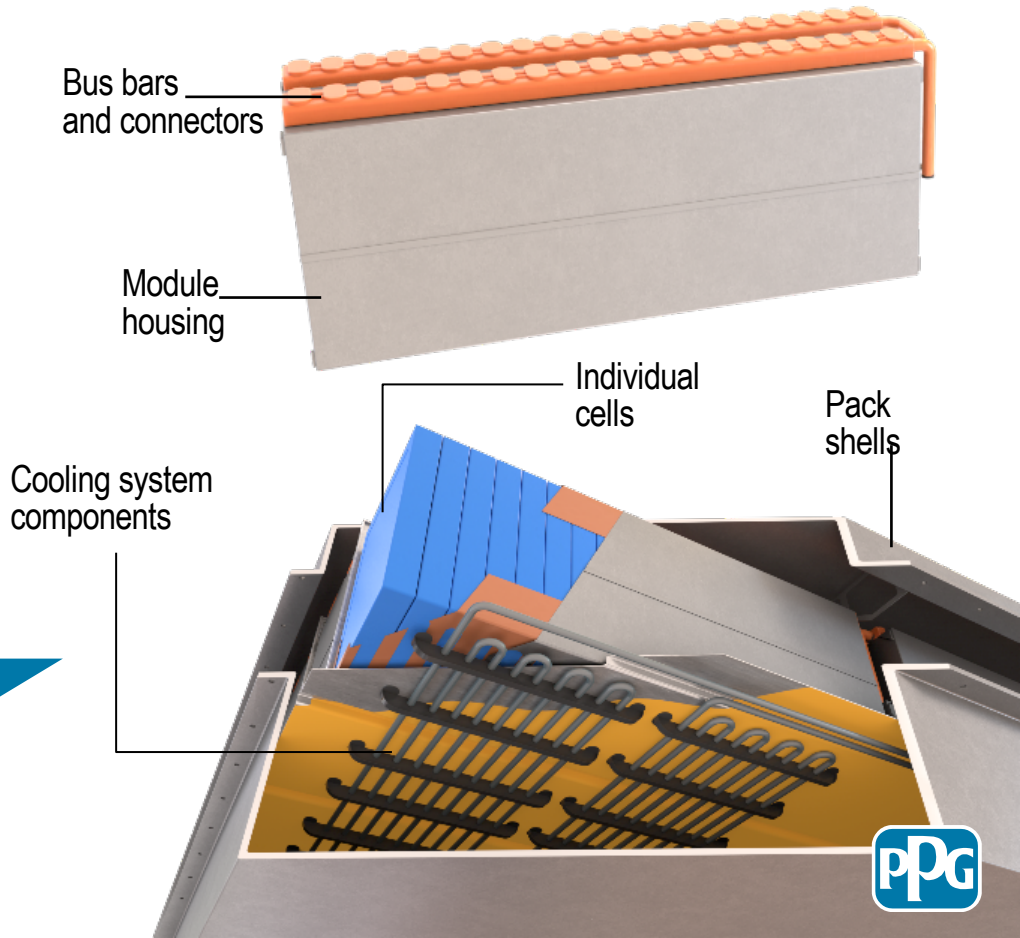
Essential for safe operation:

- Electrically insulating
- Stable to high voltage electrical fields
- Isolate high-voltage electrical components from one another and from people

Used to isolate:

- Many components within the assembly
- 3D and complex shapes
- Different and specialized requirements

Industry formerly using film, tape & sleeves which have emerging challenges



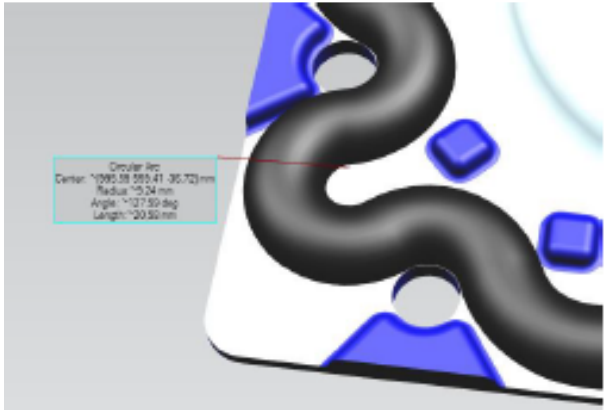
CORASEAL ® EV : Sealing Management

1K Solution

- Density: 1.45
- Automated application (Temp 90 -100°C)
- Minimum time between bead application and lid assembly: 1mins at RT
- Hardness: 15 Shore A
- Service-able
- 12 month shelf life

2K PU Foaming Solution

- Density: 0.4 – 0.5
- Viscosity:
  - Part A: 25,000 – 35,000 mpa.s
  - Part B: 200 mpa.s
- Mixing Ratio: 100/22
- Minimum time between bead application and lid assembly: 20mins at RT
- Automated application with dynamic mixing head
- Shore Hardness: 70 shore 00



CORATHERM ® Thermal Conductive Gap Filler

Example tailored thermal solutions: 2 case studies

Case study 1: 2K CORATHERM

- Standard attributes
  - Thermal conductivity
  - Thermal cycle stability
  - Automated dispense capable
  - Reach Compliant
- Design specific key attributes
  - Thin bond line
  - Low thermal impedance
  - Removability for ease of service
  - Hybrid resin systems
  - 1:1 mix ratio

Case study 2: 1K CORATHERM

- Standard attributes
  - Thermal conductivity
  - Thermal cycle stability
  - Simple dispensing process
  - Reach compliant
- Design specific key attributes
  - Low abrasiveness
  - Removability for ease of service
  - Electrical isolation
  - No creep over use lifetime
  - Flat ribbon application

Customized solutions for productivity, performance and applied cost advantages

PPG Battery Fire Protection (BFP)

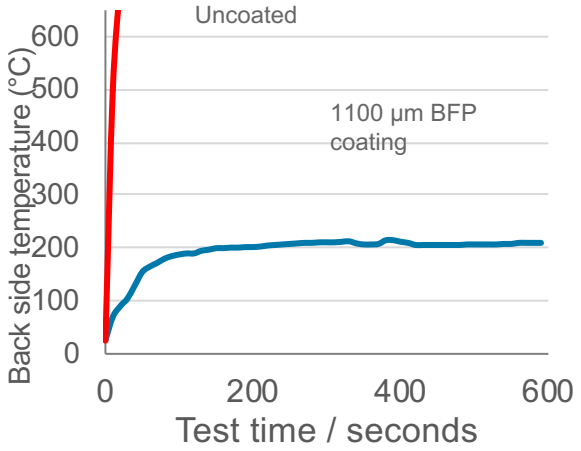
Technologies under qualification for high nickel active thermal events

- Leveraging proven intumescent technologies
- Very strong char after 1200 °C flame test
- Able to withstand >2000 °C for 4-5 minutes

Property	Performance
Number of components	2
Color	White
Gloss	Semi-gloss
Applied Density	1.2 – 1.4 kg/L
Volume Solids	100%
VOC	0 g/L
Theoretical Spread Rate	2.0 m^2/L for 500 µm
Expansion After Fire	10 – 40 times
Application Data	
Recommended Film Thickness	200 – 1,500 µm
Dry to handle	24 hours at 23° C (20 minutes at 120° C)
Shelf Life (When Stored Cool & Dry)	6 months: base and hardener

Tested panel protected with PPG BFP

1,200° C Flame Test
Panel Back Temp Vs. Time



Applying experience with jet fire mitigation to tailor solutions for highly energetic actives and high velocity cell rupture blasts

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