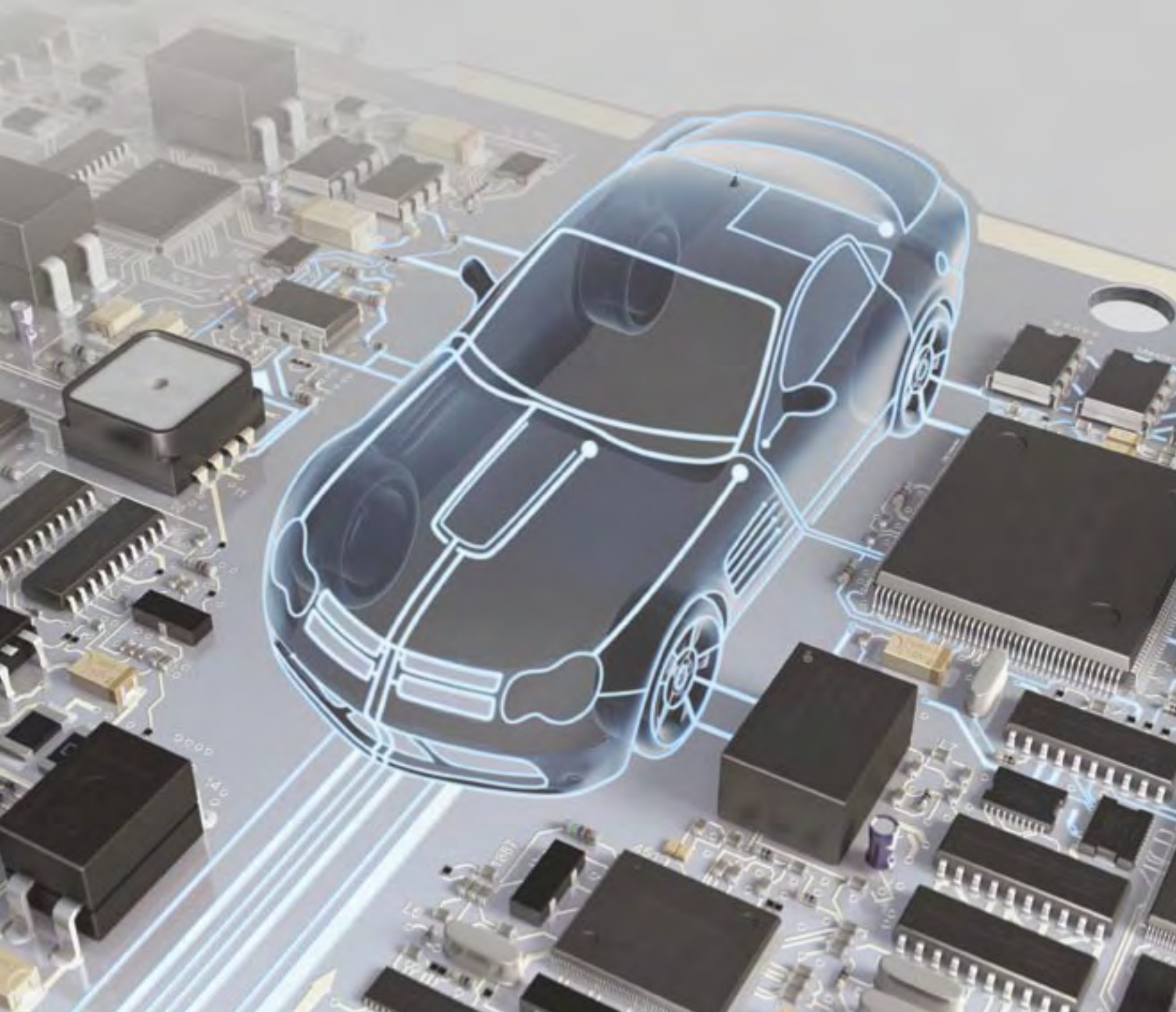


**HUNTSMAN**

Enriching lives through innovation

# For electronic applications Organic protective solutions in automotive



# The driving force of energy networks

## High performance materials

Huntsman Advanced Materials is a leading global supplier of organic protective solutions for electronic applications in automotive.

For more than 30 years, leading Tier One and Tier Two suppliers as well as automotive OEMs have turned to Huntsman Advanced Materials for innovative solutions to build, structure and assemble printed circuit boards and to encapsulate, insulate and bond electrical and electronic components.

Building circuit boards	Azyral® halogen-free laminating resins
	Kerimid® bismaleimide laminating resins
	Probelec® liquid dielectrics
	Probelec® LD flex adhesives
Structuring circuit boards	Probelec® gap fillers
	Probimage® liquid etch resists
	Probimer® solder masks
	Probimer® LDI solder masks and resists
Assembling circuit boards	Araldite® surface mount adhesives
	Araldite® high purity silver conductive adhesives
Encapsulating electrical and electronic components	Araldite® epoxy encapsulation resins
	Arathane® polyurethane encapsulation resins
	Araldite® LED encapsulation resins
	Euremelt® thermoplastic encapsulation resins
Insulating electrical and electronic components	Araldite® epoxy insulating resins
Bonding electrical and electronic components	Araldite® high-performance adhesives



# From experience to innovation

## Increasing performance

### From rain sensors to telematics

Consumers demand increasingly sophisticated features on vehicles including safety systems such as distance controls and night vision devices, comfort features such as rain sensors and adaptive lighting, and improved information via telematics equipment. Advanced Materials offers solutions in the automotive segments:

- Powertrain systems
- Safety systems
- Infotainment and comfort systems

## Reliable in harsh operating environment

Key to the continued development of electronics for cars is their ability to perform reliably, even when exposed in harsh operating environments. Designed to produce long-lasting reliability, materials in automotive electronics must be compatible with the miniaturization goal. At the same time, they have to support fast, high-yield production processes and comply with environmental standards and overall cost performance.

## Breaking new ground

### Innovative solutions

Our chemists have long-standing expertise in developing advanced resins and hardeners that are based on in-house binder systems. This enables us to keep track with ever more complex requirements in automotive electronics. Research and development activities are aimed at meeting the challenges of today and tomorrow:

- High temperature requirements
- Heat transfer solutions
- Long-term reliability

## Environmental considerations

The materials we develop meet stringent OEM, RoHS, WEEE and low halogen directives, among others. Each of our products is manufactured to high safety, handling and production standards with processes continuously analyzed to avoid environmental impact.



# Access a unique product offering

## Building circuit boards

### 1 Azyral® and Kerimid® laminating resins

Halogen-free Azyral® laminating resins meet the requirements of UL 94-V-0 and are high temperature resistant up to 250°C. For highest technology, under-hood components, automakers are turning to Kerimid® bismaleimides that exhibit exceptional high temperature performance (> 250°C) along with good dielectric performance.

### 2 Probelec® liquid dielectrics

Probelec® liquid dielectrics are based on pure epoxy. They are pioneers in the build-up of microvia boards and HDI (high density interconnect) technology. The product portfolio comprises negative or positive working photodielectrics as well as thermally toughened cured systems optimized for laser ablation processing.

### 2 Probelec® LD flex adhesives

Probelec® full epoxy dielectrics are specially suited for rigid-flex and flex circuit boards.

They can be applied on full surface or in defined, discrete areas. Probelec® LD flex adhesive bonds polyimide, polyester, FR-4, copper and/or aluminum.

## Structuring circuit boards

### 3 Probimage® liquid etch resists

Probimage® liquid etch resists are designed to produce fine lines with high yields in innerlayer production.

### 4 Probimer® solder masks and resists

Excellent adhesion and proven compatibility with lead-free solder processes characterize new generation Probimer® solder masks. The materials are formulated to withstand exposure to high temperatures and are well suited to coating copper PCBs up to 250 µm. The comprehensive product range also includes Probimer 77 LDI solder mask and Probimer 355 LDI resist as well as Probimer via fillers.

### 5 Probelec® gap fillers

For higher copper configurations, up to 400 µm, Probelec® is designed to bridge the areas between high copper conductor lines in PCBs. Typical applications for these boards include building automotive power control units, DC/DC converters as well as fuse boxes.

## Assembling circuit boards

### 6 Araldite® surface mount adhesives and Araldite® high purity silver conductive adhesives

Araldite® adhesive systems are applied for efficient, cost effective and reliable assembly of printed circuit boards. The epoxy systems cure quickly and produce a consistent high dot profile.

They are non-slumping and non-stringing for dispensing, print, and pin transfer applications.

Araldite® high purity silver filled adhesive, a 100% solid one-component material, has been designed for die attach applications requiring both electrical and thermal conductivity. To maximize ionic purity, the product has been formulated with extremely pure resins.

## Encapsulating electrical and electronic components

### 7 Araldite® epoxy and Arathane® polyurethane encapsulants

Araldite® epoxy and Arathane® polyurethane encapsulating materials protect electronic control units, starter/generator systems, electric motors and high-functionality capacitors against the harsh under-hood environment - especially under humid and high temperature conditions.

### 7 Euremelt® thermoplastic encapsulants

Euremelt® thermoplastic copolyamide hotmelt adhesives and encapsulating systems are ideal for protecting non-under-hood electronic switches, sensors and relays against humidity, dust, vibration, temperature fluctuations and other potentially harmful influences. The products cure in minutes at room temperature without releasing hazardous fumes.

### 8 Araldite® LED encapsulants

High power light emitting diodes used in interior and exterior automotive lighting as well as optical infotainment systems are epoxy encapsulated to provide constant brightness and optical performance over product lifetime.

## Insulating electrical and electronic components

### 9 Araldite® epoxy insulating resins

Araldite® epoxy systems insulate car ignition coils, power diodes, modules & sensors. The products exhibit excellent electrical and mechanical properties for long-term reliability at temperatures up to 220°C. The materials also feature a low viscosity that is ideal for producing effective insulation between high-voltage coil components. They have a low CTE to resist stress cracking in electronics applications.

## Bonding electrical and electronic components

### 10 Araldite® high performance adhesives

Araldite® bonding systems are high-performance adhesives used to bond, seal and join electrical and electronic materials in automotive applications.



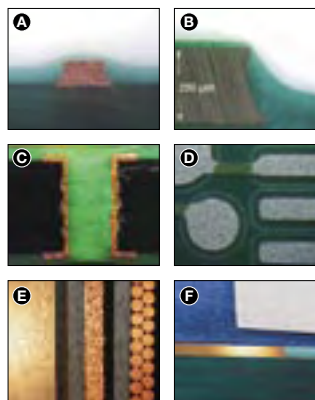
# Organic protective solutions

## From circuit boards to electronic devices

Huntsman Advanced Materials can provide complete innovative solutions that are used at virtually every stage in the automotive industry - from the production of printed circuit boards to electronic devices.

Our broad range of materials is currently used to produce automotive electronics that comprise many of the advanced technologies used on today's vehicles including:

- Powertrain systems
- Safety systems
- Infotainment and comfort systems

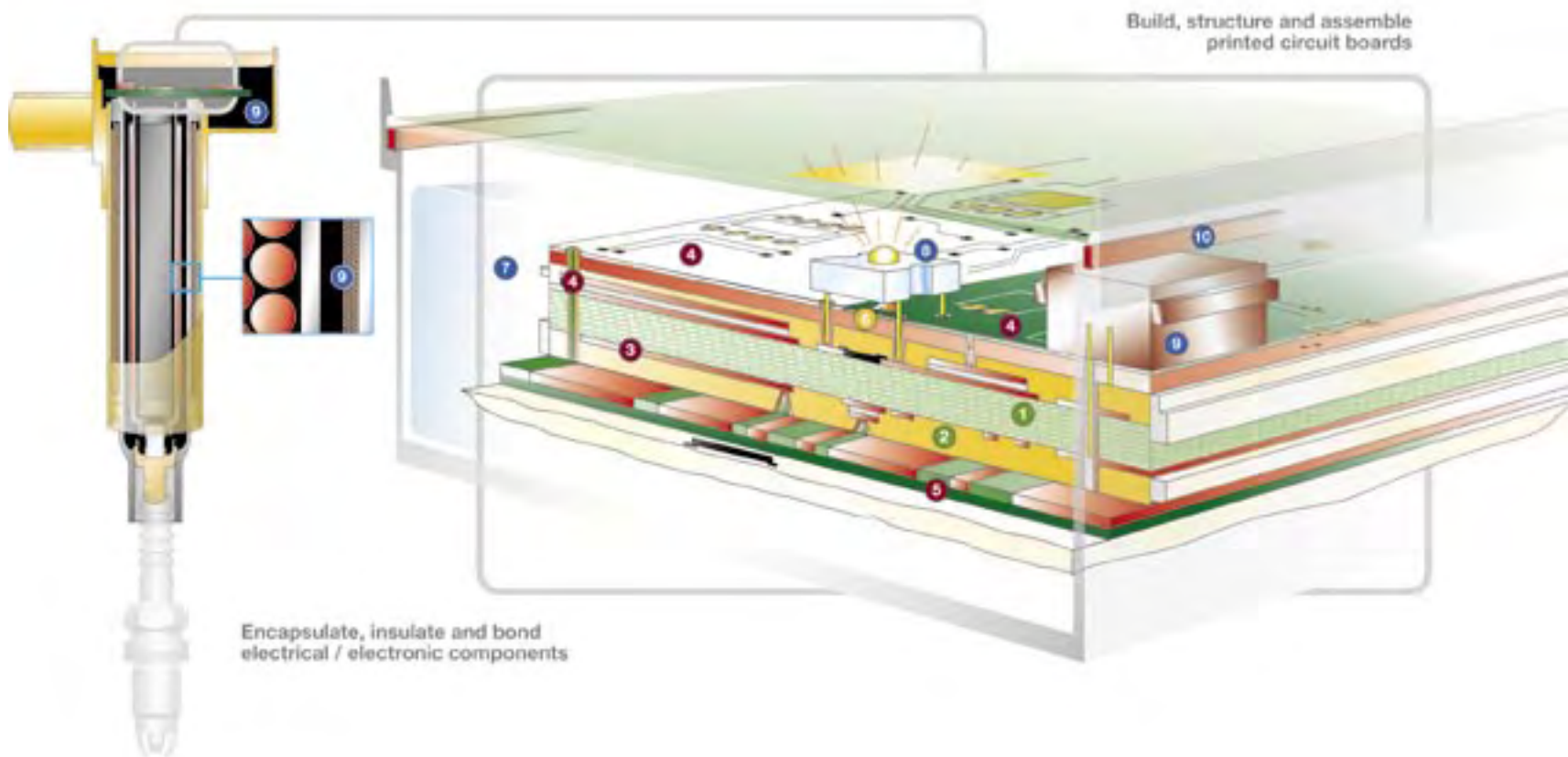


### Circuit boards

- A. High dielectric strength (150 kV/mm) with 10  $\mu\text{m}$  edge coverage only
- B. Single coating of high copper boards
- C. Reliable plugging of vias
- D. Wide process window for immersion tin surface finishing

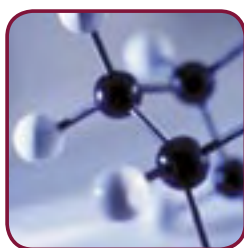
### Electrical and electronic components

- E. Pencil coil insulation for 30 kV insulation
- F. Encapsulation of assembled circuit boards to withstand harsh environment conditions





# Development partner



## Start from scratch

### From molecules to high-end requirements

Our unique R&D capabilities start from the very basics: we synthesize our polymers in-house and tailor the binder molecules to provide the desired high-end reliability in terms of chemical, electrical and mechanical properties. Thus, our customized product systems meet even the most demanding requirements and demonstrate their reliability in corrosive and harsh, high humidity environments.

### Comprehensive testing facilities

All products are tested in-house in our electrical and mechanical testing labs to ensure they provide the desired properties and they comply with environmental requirements. We also have our own certified UL lab, which speeds up the approval process and minimizes time-to-market.

### From small to high volume production

Before going into production, the upscaling of the polymer binders is done in the kilolab, using mini model versions of our high volume production equipment.

### Meeting high quality requirements

For both product application and quality control, we use state-of-the-art production equipment which is also in place at our customers' in daily production.

## Anticipate tomorrow's needs

Our unique facilities and the in-depth know-how of our staff make us a preferred partner when it comes to designing new products. Close cooperation with key industry partners ensures our solutions anticipate the technological needs of tomorrow.

## A worldwide presence

Globally and strategically located, Huntsman Advanced Materials operates worldwide, shortening logistics routes with manufacturing plants in the Americas, Europe and Asia Pacific. Providing local support for our customers is our first priority. Our regional technical centers are equipped with state-of-the-art technology and enable us to respond to customer requirements fast.

To obtain more information on our products and the services we can offer to our customers, please visit our website:

[www.huntsman.com/electronics](http://www.huntsman.com/electronics)

or contact us at:

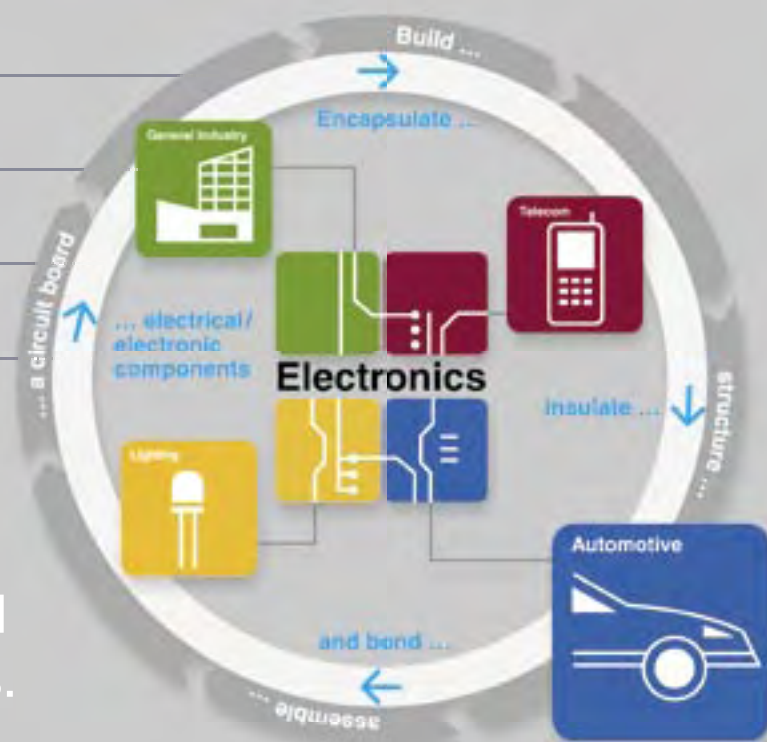
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We provide organic protective solutions for electronic applications in

- Automotive
- Telecommunication
- General Industry
- Lighting

to build, structure and assemble printed circuit boards and to encapsulate, insulate and bond electrical and electronic components.



# HUNTSMAN

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