

# EPOXIES AND AUTOMOTIVE

EPOXY RESIN COMMITTEE



Epoxy resins are widely used in the automotive industry as protective coatings, preserving vehicles and extending their average lifespan.

## Greater body protection and longer lasting vehicles

Epoxy-based coating technology was introduced in the vehicle production process 30 years ago, providing great advantages in preventing rust and corrosion on vehicles' body and key metal parts. This technology is known as Waterborne Cathodic Electro Deposition and involves applying a thin anti-corrosive epoxy-based coating as a primer to metal parts.

This technique came into widespread use in the 1980s<sup>1</sup> and is used in 90% of cars produced today.

After being applied, coatings are cured and covered by a more visually appealing paint which serves both as a top-coat and helps protect the primer from damages by UV light.

The role of epoxy resins is to provide superior adhesion to metal and resistance to corrosive agents.<sup>2</sup> Furthermore, epoxy enables the application of a thin<sup>3</sup>, uniform coating directly onto the metal, even in very small spaces and cavities, creating a uniform texture.

## Better fuel efficiency and lighter structure

In addition to the use in corrosion-resistant paints, epoxies are used in other key applications of the automotive manufacturing industry because of properties such as heat resistance, adhesion and mechanical strength. Some components using epoxies include:

- One-component adhesives
- Electrical insulation coils
- Electrical laminates
- Encapsulation systems for electronics
- Lightweight automotive composite parts

Additionally, automotive designers are developing new applications, such as components of electric/hybrid vehicles, parts for suspension systems, drive shafts, various kinds of load-bearing structures of car bodies, etc.<sup>4</sup>

<sup>1</sup> Coatings Formulations, Bodo Müller and Ullrich Pott, in Waterborne Stoving Enamels, 4.4 Electrodeposition, Vincentz, Part II: Waterborne Paints, 2006; Paint and Surface Coatings, D.A. Ansdell 1987.

<sup>2</sup> Guide to Cleaner Technologies: Organic Coating Replacements, Environmental Protection Agency, 1994

<sup>3</sup> Typically about 20 microns, according to "E-Coat Film Thickness Capabilities", Products Finishing Magazine, 2012

<sup>4</sup> Structural Composites in Cars: Charting their manufacturing processes and evolution, in both racing and road cars, Road and Track, 2011

To ensure that our European auto production remains globally competitive, it is essential that the industry embraces internationally accepted high-standard epoxy composites and corrosion protection technologies.

### **Environmental advantages**

The use of epoxies in vehicles reduces the weight of the finished part. The benefits of reducing the weight of a car or a truck include lower fuel consumption and operating costs, resulting in fewer emissions as well.

Compared to alternative older technologies, epoxies help reduce overall environmental impact. As epoxy-based paint adheres directly to the metal, air emissions and landfill waste are reduced during the production process. In addition, keeping vehicles in service longer conserves energy and raw materials, keeping costs in check and improving the vehicle's carbon footprint.<sup>5</sup>

### **Not only automotive – many other uses in transport**

Epoxy resins are not only used in the automotive sector. Railways apply epoxies to replace steel in gear casings and other parts in order to reduce weight and improve service life by preventing damage from debris or corrosion. Epoxy provides excellent corrosion resistance that reduce the need for repair and maintenance in boats.

In the aerospace industry, epoxies allow for greater use of composite components, contributing to lowering emissions and improving durability, efficiency, strength and reliability. The weight savings achieved by using epoxy composites are estimated to reduce fuel usage by some 230 million kg per year, saving €139 million in fuel costs and 720,000 of CO<sub>2</sub> aircraft emissions per year.

In total, the European transport sector uses about 49,000 tonnes of epoxy resins produced by ERC members annually. After the energy and construction sectors, transportation takes up the third largest share of epoxy resins in the EU.<sup>6</sup>

***Did you know?*** There are currently 2.3 million automotive industry jobs. By including Russia, Europe produces 19 million vehicles per year<sup>7</sup> (about a quarter of worldwide automobiles production), resulting in a turnover of €500 billion of which €57 billion are exports. Annually, 5% of the €500 billion euros are invested in R&D, making it the largest private investor in research and development in Europe.<sup>8</sup> It has been calculated that by reducing paint use by 1%, European car producers would generate nearly €260 million of annual savings by using epoxy-based CED coating.<sup>9</sup>

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<sup>5</sup> Epoxy Resins: Silent Enablers of a Sustainable Economy. Market Overview and Socio-Economic Analysis of the European Epoxy Resin Industry, 2010

<sup>6</sup> 'The Socio-economic Value of Epoxy Resins', 2015

<sup>7</sup> PSA plant closing leaves Europe with 18 factories too many, Automotive News Europe, 2013

<sup>8</sup> ACEA Automobile Industry Pocket Guide, European Automobile Manufacturers Association 2011

<sup>9</sup> Epoxy Resins: Silent Enablers of a Sustainable Economy. Market Overview and Socio-Economic Analysis of the European Epoxy Resin Industry, 2010