

Auto Body Paint lab

Automotive paint is paint used on automobiles for both protection and decoration purposes. Water-based acrylic polyurethane enamel paint is currently the most widely used paint for reasons including reducing paint's environmental impact.

Modern automobile paint is applied in several layers, with a total thickness of around 100 μm (0.1mm). Paint application requires preparation and primer steps to ensure proper application. A basecoat is applied after the primer paint is applied. Following this, a clearcoat of paint may be applied that forms a glossy and transparent coating. The clearcoat layer must be able to withstand UV light.

Processes and coatings

Preparation

High-pressure water spray jets are directed to the body. Without proper pretreatment, premature failure of the finish system can almost be guaranteed. A phosphate coat is necessary to protect the body against corrosion effects and prepares the surface for the E-Coat.

The body is dipped into the Electro-Coat Paint Operation (ELPO/E-Coat), then a high voltage is applied. The body works as a cathode and the paint as an anode sticking on the body surface. It is an eco-friendly painting process. In E-Coat, also called CED paint, utilization is approximately 99.9% and has great salt spray test life compared to other painting processes.

Primer

The primer is the first coat to be applied. The primer serves several purposes.

It serves as a leveler, which is important since the cab often has marks and other forms of surface defect after being manufactured in the body shop. A smoother surface is created by leveling out these defects and therefore a better final product.

It protects the vehicle from corrosion, heat differences, bumps, stone-chips, UV-light, etc.

It improves ease of application by making it easier for paints to stick to the surface. Using a primer, a more varied range of paints can be used.

Base Coat

The base coat is applied after the primer coat. This coat contains the visual properties of color and effects, and is usually the one referred to as the paint. Base coat used in automotive applications is commonly divided into three categories: solid, metallic, and pearlescent pigments.

Solid paints have no sparkle effects except the color. This is the easiest type of paint to apply, and the most common type of paint for heavy transportation vehicles, construction equipment and aircraft. It is also widely used on cars, trucks, and motorcycles. Clear coat was not used on solid colors until the early 1990s.

Metallic paints contain aluminium flakes to create a sparkling and grainy effect, generally referred to as a metallic look. This paint is harder to manage than solid paints because of the extra dimensions to consider. Metallic and pearlescent paints must be applied evenly to ensure a consistent looking finish without light and dark spots which are often called "mottling". Metallic basecoats are formulated so that the aluminium flake is parallel to the substrate. This maximises the "flop". This is the difference in the brightness between looking perpendicularly at the paint and that at an acute angle. The "flop" is maximised if the basecoat increases in viscosity shortly after application so that the aluminium flake which is in a random orientation after spraying is locked into this position while there is still much solvent (or water) in the coating. Subsequent evaporation of the solvent (or water), leads to a reduction in the film thickness of the drying coating, causing the aluminium flake to be dragged into an orientation parallel to the substrate. This orientation then needs to be unaffected by the application of the clear coat solvents. The formulation of the clear coat needs to be carefully chosen so that it will not "re-dissolve" the basecoat and thus affect the orientation of the metallic flake but will still exhibit enough adhesion between the coatings so as to avoid delamination of the clear coat. A similar mode of action occurs with pearlescent pigmented basecoats.

Pearlescent paints contain special iridescent pigments commonly referred to as "pearls". Pearl pigments impart a colored sparkle to the finish which works to create depth of color. Pearlescent

paints can be two stage in nature (pearl base color + clear) or 3 stage in nature (basecoat + pearl mid-coat + clear-coat).

Clearcoat

Usually sprayed on top of a colored basecoat, clearcoat is a glossy and transparent coating that forms the final interface with the environment. For this reason, clearcoat must be durable enough to resist abrasion and chemically stable enough to withstand UV light. Clearcoat can be either solvent or water-borne.

One part and two part formulations are often referred to as 1k and 2k respectively. OEM (original equipment manufacturer) clear coats applied to the metal bodies of cars are normally 1K systems since they can be heated to around 140 deg C to effect cure. The clear coats applied to the plastic components like the bumpers and wing mirrors however are 2K systems since they can normally only accept temperatures up to about 90 deg C. These 2 K systems are normally applied "off line" with the coated plastic parts fixed to the painted metallic body. Owing to the difference in formulation of the 1K and 2K systems and the fact they are coated in different locations they have a different effect on the "redissolving" of the metallic base coat. This is most easily seen in the light metallic paints like the silver and light blue or green shades where the "flop" difference is most marked.

Courses in this Lab:

S.No	Domain	Course Name	Hours	Mandatory Prerequisite
1	Auto Repair & Paint	Auto Body Repair, Denting And Painting	20	Mechanical, Automobile, Production Engineering (2 nd Year)
2	Auto Repair & Paint	Repair And Overhauling Of Chassis System (Passenger Cars)	30	Mechanical, Automobile, Production Engineering (2 nd Year)