

UNIT

7

Painting of Automobiles**Structure**

- 7.1 Constituents of paints
- 7.2 Methods of painting
- 7.3 Painting Procedure
- 7.4 Reasons for failure of paint.

Learning Objectives

After studying this unit the student will be able to understand the

- Constituents of automobile paint
- Painting methods and processes
- Reasons for failure of paints in automobiles.

7.1 Constituents of Paints

Usually a paint consists of the following ingredients

1. Vehicle
2. Pigment
3. Enamel
4. Drier
5. Thinner

Vehicle

It is the main constituent of paint in solid form. It is the actual colour ingredient of the paint which forms the film. It is also known as binder. The most commonly used binders are synthetic or natural resins such as acrylics vinyl-acrylics, Vinyl-acetate/ethylenes; polyurethanes polyester, melamine resins, epoxy or oils.

Pigment

Pigments are granular solids incorporated in the paint to contribute colour. The pigments impart toughness, texture to give the paint special properties. It does not allow the main vehicle to loosen the paint particles. Titanium dioxide is used as pigment in most paints Silica, Alumina, Zirconium are also used as pigments. These materials give better exterior durability or better hiding performance.

Enamel

The enamel portion of paint is mixed with vehicle and pigment to give it glazing appearance.

Drier

The drier in the paint allows the paint to dry as fast as possible so that the paint may not slip down from the body of the automobile to give it a uniform appearance at all parts of the body. Driers are oxygen carrying catalysts. They accelerate the drying of the oil film by oxidation, polymerization and condensation. Most effective driers used are resinates, linoleates, tungstates and naphthalenes of copper, manganese, lead and zinc.

Thinners

The thinner in the paint is used to make it thin while mixing the vehicle, pigments and drier. It enables the paint to spread easily and also to be sprayed as the case may be. It is a volatile substance. Therefore evaporates after the paint has been applied. Popularly used thinners are turpentine, mineral spirits, benzene, dipentene, naphthalene, xylol, kerosene, methylated naphthalene etc.

7.2 Methods of Painting

Different types of painting methods are being applied for painting of automobiles

- (i) Brushing
- (ii) Dipping

(iii) Roller coating

(iv) Spraying

(v) Tumbling

Brushing

In automobiles some of the inner parts which can not be in reach of spray gun, can be painted by brushing with automobiles paints using paint brush.

Dipping

The parts of irregular shape and small in size can either be sprayed nor brushed. Such parts can be removed from the vehicle and dipped in a drum filled with paint.

Roller Coating

In automobiles the parts which are in sheet shaped can be painted by roller coating . The sheet shaped articles are passed though the rollers which are dipped in paint. By rotating the rollers on the sheets, the paint will be applied uniformly.

Spraying

The entire outer surface of the vehicle body is painted by means by spraying the paint with spray gun. In this method the paint is atomized by the force of compressed air or by the action of high pressure compression of paint and turning of paint into small particles which travel to the article to be painted.

Tumbling

Small sized articles are painted by this method. They are put in a rotating barrel containing properly mixed paint . The barrel is closed and rotated for a suitable amount of time. Articles get coated with paint and after taking out, they will be finally dried.

7.3 Painting Procedure

As anyone who's ever detailed by hand can tell you, painting a car is anything but simple. However, automotive manufacturers have developed several different techniques for body painting that yield effective, reliable results. The process is completely automated and works mainly through sealed chambers built onto the assembly line.

Step 1: Electrocoating

To keep the paint from peeling off or forming unsightly “bubbles” of rust underneath, the entire exterior must be protected from corrosion. Getting into each and every crevice with aerosol-sprayed paint can be difficult and expensive, even with a completely automated system. Instead, chains are attached to the chassis and the body is lowered by machine into a solution of ionically charged paint particles. The chain is electrically conductive and linked to a larger circuit. Meanwhile, the vat containing the paint solution is equipped with electrodes linked to the same circuit. When the body gets submerged, the circuit is completed, causing the current to flow from the vat electrodes, into the metal exterior and up the chain. In the process, this electrical field pulls the ionic paint particles toward the metal exterior, completely coating it.

After about 15 minutes of electrocoating, the body is hoisted out of the vat and carried (via a ceiling-mounted track) to a “drying chamber” where heat lamps dry the excess paint.

Step 2: Primer

Once the anti-corrosive layer has been electroplated on, primer is applied to add smoothness and allow a top paint layer to stick to the body. First, the body is lowered off the chains to rest on a floor apparatus attached to a track. To apply the primer, the body moves down the track into a special sealed room called a “flow chamber” (Figure 1). The flow chamber features a constant flow of air that takes vaporized primer particles from openings in the ceiling where they gently deposit on the exterior for a uniform thickness. Meanwhile, the bottom of the chamber has several outlet openings attached to a vacuum, removing excess primer to be collected and reused. After about 10 minutes, the body is moved down the track to another drying room.

Step 3: Base Coat

Once the primer has dried, the body moves into another flow chamber for the application of the base coat. The base coat constitutes the actual “color” of the car, including textural details like aluminum flakes for a sparkle effect. Like the primer, the base coat’s application involves the continual flow of vaporized paint across the body for about 10 minutes, followed by a trip to a drying room.

Step 4: Clear Coat

Just as the electrocoating protects metal from corrosion, the clear coat protects the base coat against light scratches, organic solvents, water and UV sun damage. As the name suggests, it is transparent, showcasing the base coat like glass does a picture. Typically, a flow chamber applies the clear coat as well.

7.4 Reasons for Failure of Paint

Chalking

It is the progressive powdering of paint film on the painted surface. This occurs because of improper dispersion of pigment and vehicle.

Flaking

Peeling out of paint film from the painted surface is known as flaking. This is due to the presence of dust or greasy matter in the paint. Improper surface preparation may also cause this.

Cracking

Cracking of paint occurs because of

- (i) Unequal expansion and contraction of coats
- (ii) Variation of temperature of exposed film.

This can be prevented by applying a primary hard coat.

Colour Change

This happens because of chemical effects of atmospheric gases in the environment.

Summary

- A paint consists of the following ingredients :
 - i. Vehicle
 - ii. Pigment
 - iii. Enamel
 - iv. Drier
 - v. Thinner
- A vehicle is the actual color ingredient and is also known as binder.

- Pigments are granular solids to contribute colour.
- Enamel is used in painting for glazing appearance.
- Drier allows the paint to dry as fast as possible.
- Methods of painting - Brushing, Dipping, Roller coating, Spraying, Tumbling.
- Reason for failure of paint - Chalking, Flaking, Cracking, Colour change.

Short Answer Type Questions

1. What are the constituents of Paint?
2. Mention the methods of vehicle painting.
3. What is chalking in painting of automobile?
4. What is flaking of Automobile painting?

Long Answer Type Questions

1. Explain the ingredients of painting.
2. Briefly explain the painting methods.
3. Explain step by step process of Automobile painting.