Paint Defect Diagnosis

Index

1. Before Mixing

- Bodying
- Contamination

2. During Application

- Bleeding
- Cissing
- Clouding
- Cobwebbing
- Contamination
- Dirt
- Dry Spray
- Hands on Metal
- Inadequate Color Coverage
- Lifting
- Orange Peel
- Overspray
- Pickling
- Runs & Sags
- Silking
3. During Drying / Curing

- Bleeding
- Blowing
- Cissing
- Contamination
- Dirt
- Hands on Metal
- Runs & Sags
- Slow Drying

4. After Drying

- Acid Attack
- Bleaching
- Blistering
- Blooming
- Blushing
- Bridging
- Bronzing
- Chalking
- Contamination
- Corrosion
- Cracking
- Crazing
4. After Drying (continued)

- Dull Finish
- Feather Edge Cracks
- File Marks
- Flaking
- Mapping
- Panel Faults
- Pinholing
- Polishing Marks
- Poor Color Match
- Sanding Scratches
- Solvent Popping
- Stone Chips
- Water Spotting
- Wax Incorporation
Paint Defect Diagnosis

Bodying

Description
The thickening of paint in the can.

Cause
a. Loss of solvents.
b. Oxidation or polymerisation.

Prevention
a. Keep can tightly sealed.
b. Store in cool place.

Rectification
NOTE:
Thickened lacquer paints can often be made usable again by addition of good quality thinner.
Paint Defect Diagnosis

Contamination

Description
Spots, speckles or splash-like deposits on, or discoloration and staining of, the paint surface. The surface may have greasy or tacky spots, be coated with particles, or feel gritty.

Cause
Foreign substances or chemicals adhering to, or becoming embedded in the paint. Common sources are:

a. Tree sap and resins, wet leaves, berries, fruit or bird droppings allowed to remain on the paint.
b. Metallic particles becoming embedded in the surface of the paint and oxidising.
c. Salt deposits resulting from the evaporation of liquids on the surface. These may also lead to blistering.
d. Cement or other chemically active dust.
**Prevention**

a. Do not allow any deposits to remain on the paint surface.

b. Ensure the paint film is fully cured.

c. Store vehicles under cover and away from possible sources of contamination. Take special care not to expose new paint finishes to environments likely to cause contamination.

d. If an oven or drying room is used ensure that the filtration system is working properly, and that no industrial fumes enter the room.

**Rectification**

Light staining may be removed by washing the surface with a mild detergent solution, followed by washing with a 10% Oxalic acid solution to remove ferrous compounds. Rinse, compound and polish to restore the gloss. If discoloration and staining persist, rub down the surface and repaint.
Paint Defect Diagnosis

Bleeding

Color Change

Description
Discoloration of the topcoat, either in the form of a halo, or, in severe cases, a complete color change. This defect usually only occurs when spraying over red or maroon paint.

Cause
Absorption of pigment from the underlying paint, dissolved by the solvents of the new coat.

Prevention
a. Test the original finish by spraying a small, flatted area.
b. Use an approved bleeding inhibitor sealant.
c. Remove any overspray from the surface before painting.

Rectification
Rub down to the original finish, seal with a recommended sealer and repaint.
Description
Small, crater like holes or indentations in the paint surface, varying in size from pinholes up to 1 cm in diameter. Usually the larger craters occur individually, whilst the smaller ones are often found in small densely packed clusters.

Small impurities are often visible in the centre of the crater.

Cause
Variations in the surface tension of the paint.
The most common reasons for this are:
a. Silicone in the environment or on the surface of the substrate; even minute traces are sufficient to cause cissing.
b. Contamination by other sources, such as grease, dried soap, detergent, spray dust, wax, or oil from the spray gun.
c. Incompatible elements in the primer.
d. Saturation by fumes in the spray booth.
**Cissing**

**Prevention**

a. Thoroughly clean any silicone polishes from the surface to be painted and avoid using silicone polishes in the vicinity of the paint shop. Prepare the surface using the same preparation procedure as that set out below.

b. Thoroughly clean the surface with wax and grease remover. Do not allow cleaning solvents to dry on the surface but remove with a clean dry cloth, using the cloth only once.

   Clean surfaces prior to sanding and always ensure that all sanding dust is removed. Prepare bare metal surfaces with metal conditioner.

   Repeat the solvent cleaning operation prior to commencing spraying.

   Ensure that the spray gun and compressed air equipment is properly maintained.

c. Always use the recommended materials.

d. Ensure that the spraying area is properly ventilated.

**Rectification**

Remove the paint completely from the affected area repaint, following the recommended preparation procedure.

In extreme circumstances it may be necessary to use an anti-cissing additive. Always consult the paint manufacturer before using such additives.
Paint Defect Diagnosis

Clouding

Color Change, Floatation, Floating, Flooding, Haloing, Lapping Marks, Mottling, Patchiness, Ringing, Shadowing, Striping, uneven Application

Description
Color variation in metallic paint, with patches of lighter or darker tint, often in streaks following the direction of spraying.

Cause
Irregular application density of the basecoat.
This is a result of:
   a. Poor spraying technique.
   b. Poor pattern from the spray nozzle.
   c. Paint too wet, insufficiently mixed paint, poor quality or wrong type of thinner.
   d. Surface too hot or too cold.
Paint Defect Diagnosis

Clouding

Color Change, Floatation, Floating, Flooding, Haloing, Lapping Marks, Mottling, Patchiness, Ringing, Shadowing, Striping, uneven Application

Prevention

a. Use the correct spraying technique.
b. Adjust the nozzle to the correct pattern before commencing spraying.
c. Ensure that the paint is thoroughly mixed to the correct consistency.
   Use only recommended thinner.
d. Ensure that the surface is within the recommended temperature range.

Rectification

If the clearcoat has not been applied, shade the base, otherwise rub down the surface and repaint.
**Paint Defect Diagnosis**

**Cobwebbing**

**Webbing**

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**Description**

Paint issues from the spray gun nozzle and is accelerated by the airstream in which it divides into filaments which extend and break up. Failure of the filaments to break up or "atomize" is known as cobwebbing.

**Cause**

a. Use of cold paint which has thickened considerably.
b. Incorrect pressure and/or viscosity too high.
c. Use of cheap or incorrect thinner.

**Prevention**

a. Apply at correct pressure and viscosity.
b. Use correct quality thinner.
**Rectification**

Reduce air pressure and / or viscosity until cobwebbing disappears.

**NOTE:**

Some specialised materials, tank linings for example, are difficult to atomise and require special equipment to be sprayed successfully.
Paint Defect Diagnosis
Contamination

Description
Spots, speckles or splash-like deposits on, or discoloration and staining of, the paint surface. The surface may have greasy or tacky spots, be coated with particles, or feel gritty.

Cause
Foreign substances or chemicals adhering to, or becoming embedded in the paint. Common sources are:

a. Tree sap and resins, wet leaves, berries, fruit or bird droppings allowed to remain on the paint.
b. Metallic particles becoming embedded in the surface of the paint and oxidising.
c. Salt deposits resulting from the evaporation of liquids on the surface. These may also lead to blistering.
d. Cement or other chemically active dust.
**Paint Defect Diagnosis**

**Contamination**

*Airborne Contamination, Cement Dust, Contamination, Fall Out, Industrial Fallout, Rust Specs, Specs, Spots*

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**Prevention**

a. Do not allow any deposits to remain on the paint surface.

b. Ensure the paint film is fully cured.

c. Store vehicles under cover and away from possible sources of contamination. Take special care not to expose new paint finishes to environments likely to cause contamination.

d. If an oven or drying room is used ensure that the filtration system is working properly, and that no industrial fumes enter the room.

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**Rectification**

Light staining may be removed by washing the surface with a mild detergent solution, followed by washing with a 10% Oxalic acid solution to remove ferrous compounds. Rinse, compound and polish to restore the gloss. If discoloration and staining persist, rub down the surface and repaint.
Description
A rough, irregular surface to the paint film is easily felt with the hand. The particles are often totally embedded in, and covered by the film.

Cause
Contaminating particles incorporated in the paint.
These may be the result of:
a. Dust, dirt or threads falling from cloth or clothing or blown out of mouldings or panel joints during spraying, setting on the wet paint film.
b. Dust not properly removed from the surface prior to spraying.
c. Airborne particles setting on and becoming incorporated in the paint film during or immediately after spraying.
d. Dirt in the paint or thinners resulting from open or rusty cans.
Paint Defect Diagnosis

Dirt

*Bits, Dirt Inclusions, Dirt Nibs, Grittiness, Seed, Specs*

**Prevention**

a. Ensure that cloths and clothing are clean and dust free, blow out mouldings and panel joints prior to spraying.

b. Clean down and tack-off the surface prior to spraying each coat.

c. Keep the spray shop clean and dust free, avoid sanding operations in the area of the spray booth. Wet down surrounding surfaces if necessary, ensure that the filtration system is working properly.

d. Keep all materials in clean, sealed containers and strain before use.

**Rectification**

Allow the paint to harden completely. Light surface dirt may be removed by flatting, compounding and polishing.

Deep embedded dirt, or dirt in synthetic paints, requires the surface to be rubbed down until smooth and repainted.
Paint Defect Diagnosis

Dry Spray

Poor Wetting

Description
A granular or coarse textured finish with no gloss.

Cause
Paint being deposited on the surface in a powdery condition.

a. Viscosity of paint too high, use of incorrect or poor quality thinner.
b. Poor spraying technique, dirty spray gun, compressed air pressure too high, gun held too far from the surface during spraying.
c. Spraying in draughts or in a high velocity airflow.

Prevention

a. Use the correct proportion of recommended thinner.
b. Use correct spraying techniques, ensure that equipment is clean, set air pressure as low as possible, consistent with proper atomisation, spray from the correct distance.
c. Use a spray booth, and ensure that air circulation and extraction is at the correct velocity.
Paint Defect Diagnosis
Dry Spray

Poor Wetting

Rectification

Flat, compound and polish. If the texture is too coarse for this to correct the defect, rub down the topcoat and repaint. Metallic finishes must always be rubbed down and repainted.
Paint Defect Diagnosis
Hands on Metal

Finger Mark, Fingerprints

Description
(Also known as Finger Marks and Hand Print Blistering.)

Cause
No matter how clean the hands may seem, there is always some dirt, grease, oil or perspiration which will cause blistering and poor adhesion.

Prevention
Keep bare hands off the surface to be painted.

Rectification
In motor body assembly plants, cars are never directly touched with human hands. After being chemically cleaned - the operators wear cotton gloves. It is a good practice for all painters to follow.
Paint Defect Diagnosis
Inadequate Color Coverage

Grin Through, Lack of Paint, Poor Coverage, Poor Hiding, Poor Opacity, Rub Through, Show Through, Thin Paint, Transparent Film, Undercoat Showing Through, Undersprayed

Description
Underlying surfaces visible through the paint film, most frequently in hard to spray areas, on lower panels or on sharp edges and contours.

Cause
Inadequate thickness or poor covering power of the color coat. This is frequently due to:

a. Poor spraying technique.
b. Inadequate lighting, insufficient or cramped working space, inaccessibility of surfaces.
c. Poor mixing of materials.
d. Reduced thickness of the color coat due to excessive compounding and polishing.
Paint Defect Diagnosis
Inadequate Color Coverage

Grin Through, Lack of Paint, Poor Coverage, Poor Hiding, Poor Opacity, Rub Through, Show Through, Thin Paint, Transparent Film, Undercoat Showing Through, Undersprayed

Prevention

a. Use the correct spraying technique, ensure even and adequate film thickness.
b. Work under good lighting conditions in a properly sized spray booth, pay special attention to inaccessible areas.
c. Ensure that the materials are thoroughly mixed.
d. Avoid excessive compounding and polishing.
e. Take special care on edges and sharp contours.

Rectification

Flat the affected area and repaint.
Paint Defect Diagnosis

Lifting

Crinkling, Frying, Puckering, Raising, Shrivel, Swelling, Wrinkling

Description
Shrivelling, swellings, wrinkles or folds of varying severity at the paint surface.

Cause
Non uniform drying within the paint film.
This may result from:
   a. Excessive film thickness.
   b. Insufficient drying time between coats, forced drying, non uniform air temperature.
   c. Use of wrong or poor quality thinner.

Prevention
   a. Apply paint in thin, even coats.
   b. Allow sufficient drying time between coats, ensure correct, uniform drying temperature.
   c. Use only recommended thinner.
Paint Defect Diagnosis

Lifting

*Crinkling, Frying, Puckering, Raising, Shrivel, Swelling, Wrinkling*

**Rectification**

Allow the film to harden thoroughly. If the defect is slight, flat, compound and polish the affected area.

In severe cases rub down to the substrate and repaint.
**Paint Defect Diagnosis**

**Orange Peel**

*Inconsistency, Levelling, Pebbling, Poor Flow, Uneven Application*

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**Description**

Pebbled, uneven surface of the paint film, similar in appearance to orange skin.

**Cause**

Failure of the paint droplets to coalesce on the surface. This may be due to:

a. Poor spraying technique, spray gun too far from surface, incorrect compressed air pressure, incorrect nozzle adjustment.

b. Excessively thick or thin film.

c. Paint incorrectly mixed, wrong viscosity, poor quality or incorrect thinner.

d. Insufficient drying time between coats, cold air fanning to speed drying.

e. Incorrect ambient or surface temperature, draughts.
**Prevention**

a. Use the correct spraying technique and ensure that equipment is correctly adjusted.
b. Apply paint in thin even coats.
c. Ensure that the paint is correctly mixed, use only recommended thinner with the correct grade.
d. Allow sufficient drying time between coats.
e. Spray within the recommended temperature range and ensure proper ventilation.

**Rectification**

Rub out the orange peel, compound and polish. In severe cases it may be necessary to flat and repaint the surface.
Paint Defect Diagnosis

Overspray

Fuzz, Hazing, Poor Melt In

**Description**
Areas of granular paint particles adhering to, or partially absorbed in the surface of the film.

**Cause**
Spray dust deposited on the surface. This results from:

a. Poor masking.
b. Paint from a subsequent application settling on the surface.
c. Compressed air pressure too high.
d. Inadequate extraction or ventilation.

**Prevention**

a. Mask carefully and completely, ensure that the edges of masking tape are thoroughly sealed.
b. Protect adjacent surfaces from spray dust.
c. Set compressed air pressure as low as possible, consistent with proper atomisation.
d. Use a spray booth, and ensure correct air circulation and extraction.
Paint Defect Diagnosis

Overspray

Fuzz, Hazing, Poor Melt In

Rectification

Rub down with abrasive compound and polish.
Pickling

Description
Swelling or wrinkling of the paint surface, varying in severity and most often occurring around feathered edges. The underlying paint may break through the topcoat.

Cause
Reaction with the underlying surface resulting from the application of nitro or thermosetting enamels over thermoplastic acrylics or airdrying synthetics.

Prevention
Ensure compatibility of materials or that the underlying layer is thoroughly sealed.

Rectification
Rub down the affected area, taking care not to uncover any areas which could give rise to the same problem, seal the surface and repaint. In severe cases rub down the affected area to the substrate and repaint.
**Paint Defect Diagnosis**

**Runs & Sags**

*Curtaining, Drips, Gun Spits, Overloading, Pebbling, Sagging, Sags*

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**Description**

Well defined local thickening of the paint film in the form of a wavy line or shallow, rounded ridges, normally confined to sharply sloping or vertical surfaces.

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**Cause**

Slumping of the paint due to:

a. Excess thickness of application, air pressure too low, fan width too narrow, spray gun too close to the surface or moving too slowly.

b. Use of poor quality or incorrect thinner.

c. Incorrect viscosity of the paint.

d. Air of surface temperature too low.

e. Contamination of the underlying surface.
Paint Defect Diagnosis

Runs & Sags

Curtaining, Drips, Gun Spits, Overloading, Pebbling, Sagging, Sags

Prevention

a. Use the correct spraying technique and spray gun settings.
b. Use only recommended thinner.
c. Ensure that the paint is mixed to the correct viscosity.
d. Always spray within the recommended temperatures.
e. Ensure that the surface is scrupulously clean.

Rectification

Allow the paint to harden thoroughly, rub down excess paint, flat, compound and polish. In severe cases it may be necessary to rub down and repaint the surface.

NOTE:

Due to separation of the metal flakes, metallic paints will normally require repainting.
Silking

Description
Evident in metallics when all the aluminium particles tend to run the one way. Encountered mostly on vertical surfaces where the weight of the aluminium “drops” through the applied coat.

Cause
a. Applying metallics too heavily almost to the run and sag stage.
b. Wrong thinning reduction.
c. Wrong gun adjustment and technique.
d. Insufficient flash time between coats.

Prevention
a. Do not apply in heavy wet coats.
b. Use recommended thinning ratios.
c. Use good spray techniques i.e. gun held at right angles 15-20 cm from the job with a constant gun speed over complete area.
d. Allow recommended flash times between coats.
Paint Defect Diagnosis
Silking

Rectification
If silking has already occurred, sand with fine paper and refinish.
Paint Defect Diagnosis

Bleeding

Description
Discoloration of the topcoat, either in the form of a halo, or, in severe cases, a complete color change. This defect usually only occurs when spraying over red or maroon paint.

Cause
Absorption of pigment from the underlying paint, dissolved by the solvents of the new coat.

Prevention
a. Test the original finish by spraying a small, flatted area.
b. Use an approved bleeding inhibitor sealant.
c. Remove any overspray from the surface before painting.

Rectification
Rub down to the original finish, seal with a recommended sealer and repaint.
Paint Defect Diagnosis
Blowing

Air Entrapment, Air Trapping

Description
Large rounded air bubbles or blisters, usually occurring in the area of seams and boxed in corners, or over heavily filled plastic surfaces.

Cause
Air trapped beneath the paint expands, resulting in the detachment of the paint film from the substrate. This frequently results from:

a. Poor application of filler, stopper or primer resulting in entrapped air.
b. Poor feather edging of chipped film.
c. Bridging of seams and boxed corners by the paint film.
d. Porosity and air pockets in the primer due to inferior or insufficient thinner, the compressed air pressure too high, or dry spraying.
e. Failure to prepare and seal substrate correctly, especially when spraying GRP.
f. Excessive application of heat during drying.
Paint Defect Diagnosis

Blowing

Air Entrapment, Air Trapping

**Prevention**

a. Ensure correct application of filler, stopper or primer.
b. Feather edges of chipped film properly.
c. Avoid heavy paint application and ensure that the film penetrates into seams and boxed corners.
d. Always use recommended thinner and correct spraying techniques. Apply primers in thin web films.
e. Examine the substrate for porosity, especially for gel coat bubbles in GRP. Prepare and seal carefully.
f. Avoid excessive application of heat during drying.

**Rectification**

The paint must be removed to the depth of the bubble, any underlying defect remedied and the area repainted.
**Cissing**

**Craters, Fish Eyes, Saucering**

**Description**
Small, crater like holes or indentations in the paint surface, varying in size from pinholes up to 1 cm in diameter. Usually the larger craters occur individually, whilst the smaller ones are often found in small densely packed clusters.

Small impurities are often visible in the centre of the crater.

**Cause**
Variations in the surface tension of the paint.

The most common reasons for this are:

a. Silicone in the environment or on the surface of the substrate; even minute traces are sufficient to cause cissing.

b. Contamination by other sources, such as grease, dried soap, detergent, spray dust, wax, or oil from the spray gun.

c. Incompatible elements in the primer.

d. Saturation by fumes in the spray booth.
Paint Defect Diagnosis
Cissing

Craters, Fish Eyes, Saucering

**Prevention**

a. Thoroughly clean any silicone polishes from the surface to be painted and avoid using silicone polishes in the vicinity of the paint shop. Prepare the surface using the same preparation procedure as that set out below.

b. Thoroughly clean the surface with wax and grease remover. Do not allow cleaning solvents to dry on the surface but remove with a clean dry cloth, using the cloth only once.

   Clean surfaces prior to sanding and always ensure that all sanding dust is removed. Prepare bare metal surfaces with metal conditioner.

   Repeat the solvent cleaning operation prior to commencing spraying.

   Ensure that the spray gun and compressed air equipment is properly maintained.

c. Always use the recommended materials.

d. Ensure that the spraying area is properly ventilated.

**Rectification**

Remove the paint completely from the affected area repaint, following the recommended preparation procedure.

In extreme circumstances it may be necessary to use an anti-cissing additive. Always consult the paint manufacturer before using such additives.
Paint Defect Diagnosis

Contamination

Description
Spots, speckles or splash-like deposits on, or discoloration and staining of, the paint surface. The surface may have greasy or tacky spots, be coated with particles, or feel gritty.

Cause
Foreign substances or chemicals adhering to, or becoming embedded in the paint. Common sources are:

a. Tree sap and resins, wet leaves, berries, fruit or bird droppings allowed to remain on the paint.

b. Metallic particles becoming embedded in the surface of the paint and oxidising.

c. Salt deposits resulting from the evaporation of liquids on the surface. These may also lead to blistering.

d. Cement or other chemically active dust.
**Prevention**

a. Do not allow any deposits to remain on the paint surface.
b. Ensure the paint film is fully cured.
c. Store vehicles under cover and away from possible sources of contamination. Take special care not to expose new paint finishes to environments likely to cause contamination.
d. If an oven or drying room is used ensure that the filtration system is working properly, and that no industrial fumes enter the room.

**Rectification**

Light staining may be removed by washing the surface with a mild detergent solution, followed by washing with a 10% Oxalic acid solution to remove ferrous compounds. Rinse, compound and polish to restore the gloss. If discoloration and staining persist, rub down the surface and repaint.
Paint Defect Diagnosis

Dirt

*Bits, Dirt Inclusions, Dirt Nibs, Grittiness, Seed, Specs*

**Description**

A rough, irregular surface to the paint film is easily felt with the hand. The particles are often totally embedded in, and covered by the film.

**Cause**

Contaminating particles incorporated in the paint.

These may be the result of:

a. Dust, dirt or threads falling from cloth or clothing or blown out of mouldings or panel joints during spraying, setting on the wet paint film.

b. Dust not properly removed from the surface prior to spraying.

c. Airborne particles setting on and becoming incorporated in the paint film during or immediately after spraying.

d. Dirt in the paint or thinners resulting from open or rusty cans.
Paint Defect Diagnosis

Dirt

*Bits, Dirt Inclusions, Dirt Nibs, Grittiness, Seed, Specs*

**Prevention**

a. Ensure that cloths and clothing are clean and dust free, blow out mouldings and panel joints prior to spraying.

b. Clean down and tack-off the surface prior to spraying each coat.

c. Keep the spray shop clean and dust free, avoid sanding operations in the area of the spray booth. Wet down surrounding surfaces if necessary, ensure that the filtration system is working properly.

d. Keep all materials in clean, sealed containers and strain before use.

**Rectification**

Allow the paint to harden completely. Light surface dirt may be removed by flatting, compounding and polishing.

Deep embedded dirt, or dirt in synthetic paints, requires the surface to be rubbed down until smooth and repainted.
Finger Mark, Fingerprints

Description

(Also known as Finger Marks and Hand Print Blistering.)

Cause

No matter how clean the hands may seem, there is always some dirt, grease, oil or perspiration which will cause blistering and poor adhesion.

Prevention

Keep bare hands off the surface to be painted.

Rectification

In motor body assembly plants, cars are never directly touched with human hands. After being chemical-ly cleaned - the operators wear cotton gloves. It is a good practice for all painters to follow.
Paint Defect Diagnosis

Runs & Sags

*Curtaining, Drips, Gun Spits, Overloading, Pebbling, Sagging, Sags*

Description

Well defined local thickening of the paint film in the form of a wavy line or shallow, rounded ridges, normally confined to sharply sloping or vertical surfaces.

Cause

Slumping of the paint due to:

a. Excess thickness of application, air pressure too low, fan width too narrow, spray gun too close to the surface or moving too slowly.

b. Use of poor quality or incorrect thinner.

c. Incorrect viscosity of the paint.

d. Air of surface temperature too low.

e. Contamination of the underlying surface.
Paint Defect Diagnosis

Runs & Sags

Curtaining, Drips, Gun Spits, Overloading, Pebbling, Sagging, Sags

Prevention

a. Use the correct spraying technique and spray gun settings.
b. Use only recommended thinner.
c. Ensure that the paint is mixed to the correct viscosity.
d. Always spray within the recommended temperatures.
e. Ensure that the surface is scrupulously clean.

Rectification

Allow the paint to harden thoroughly, rub down excess paint, flat, compound and polish. In severe cases it may be necessary to rub down and repaint the surface.

NOTE:
Due to separation of the metal flakes, metallic paints will normally require repainting.
**Paint Defect Diagnosis**

**Slow Drying**

*Poor Drying, Softness*

**Description**

The paint film requires an excessive drying period, or fails to harden thoroughly.

**Cause**

Slow evaporation of solvent from the paint. This may be due to:

a. Excessive thickness of the paint film.

b. Poor atmospheric conditions during spraying or drying, coldness, humidity, lack of air movement.

c. Insufficient drying time between coats.

d. Insufficient, poor quality or incorrect thinner.

**Prevention**

a. Apply paint in thin web films.

b. Ensure adequate warmth and ventilation. Avoid spraying in excessively humid conditions.

c. Allow sufficient drying time between coats.

d. Use the correct amount of recommended thinner.
Paint Defect Diagnosis
Slow Drying

Poor Drying, Softness

**Rectification**

Move the vehicle to a warm, well ventilated area. Low heat may be applied to improve drying, but care must be exercised to avoid wrinkling.
Acid Attack

Description
Irregular patches of roughened, discoloured, partly stripped or disintegrating surface, possibly with crazing or cracking in the affected area. Traces of the attacking substance may be present.

Cause
Chemical corrosion of the paint film. This is often due to:

a. Accidental spillage of corrosive substances such as brake fluid, peroxide, or battery acid.
b. Acid rain standing on the surface
c. Use of detergents on new surfaces.

Prevention

a. Maintain good housekeeping practices, and protect surfaces when working on vehicles.
b. Protect vehicle during outside storage.
c. Avoid using detergents on newly painted surfaces.
d. Ensure the paint film is fully cured.
Rectification

Light damage may be remedied by flatting, compounding and polishing. In the event of more severe attack, remove the paint down to a sound surface, ensure that all traces of contaminants are removed, and repaint.
Bleaching

**Description**
Yellowing of the surface corresponding to areas of filler in the substrate.

**Cause**
Excess quantities of peroxide used in the filler.

**Prevention**
Use a feed machine for mixing filler, or take care to calculate and measure peroxide quantities accurately.

**Rectification**
Rub down the affected area to the surface of the filler, seal with isolator or epoxy primer and repaint.
Paint Defect Diagnosis

Blistering

Bubbles

Description

Blisters appear as swellings on the surface of the paint and vary considerably in both size and density. Coarse blisters, larger than 1.5 mm in diameter, generally occur in patches, although they may also be found in isolation.

Fine blisters, typically from 0.5 mm rings, meandering lines or in the shape of a finger print.

Blisters in the colour coat are generally more prominent than those occurring between paint and substrate.

Cause

Moisture or contaminants trapped under the surface. This may result from:

a. Inadequate surface cleaning, leaving residual moisture or contaminants such as oil, industrial pollutants or grease from finger tips.

b. Incompatible materials or the use of non-recommended thinners.

c. Insufficient thickness of paint leading to increased permeability.

d. Water permeating both newly applied and aged films. Exposure to rain or high humidity before the finish is fully hardened increases the risk of blisters caused by permeation.
Paint Defect Diagnosis

Blistering

Prevention

a. Protect vehicle surfaces when in store, and clean surfaces scrupulously before spraying.
b. Use only top quality recommended and approved materials.
c. Follow the correct spraying processes.
d. Avoid exposure to moisture and extreme temperature changes until the finish is fully hardened.

Rectification

Establish the depth and cause of the blister by pricking out with a pin and examining under a low power magnifying glass.

Where the blisters occur between paint layers, the affected area may be sanded down to a sound surface and repainted.

In more severe cases, or where the blisters occur between the undercoat and the substrate, strip down to the substrate and repaint.
Paint Defect Diagnosis

Blooming

Color Change, Misting

Description
A milky white haze or mist formed on the surface of the paint film.

Cause
Moisture condensing on, and being trapped in the wet film. This may be due to:

a. Spraying during cold, wet or humid weather.
b. Use of too fast or poor quality thinner.
c. Compressed air pressure too high, and/or poor spray gun set up.
d. Fanning compressed air onto the film to speed up solvent release.
e. Draughty paint shop, or inadequate heating and/or air movement.
Paint Defect Diagnosis

Blooming

Color Change, Misting

Prevention

a. If possible, avoid spraying air drying paint during raining or exceptionally cold or humid weather. If this is unavoidable, a non-bloom thinner should be used.

b. Use correct grade of thinner.

c. Reduce compressed air pressure to minimise the cooling effect.

d. Allow solvent release to take place naturally.

e. Ensure that the paint shop is adequately heated, properly ventilated and free from draughts.

Rectification

Slight blooming may be removed by the use of polishing compound, after the paint film has hardened, or by spraying the affected area with non-bloom thinners.

In more severe cases, rub down the surface, and repaint using the correct grade or thinner or non-bloom thinner.

If these remedies fail to correct the fault, raise the temperature of the paint shop by a minimum of five degrees, avoid all direct draughts, flat and repaint the affected area.

NOTE:

Blooming of the color coat may indicate that the undercoats have been similarly affected, the defect having gone unnoticed due to their matt finish. This may subsequently give rise to blistering or loss of intercoat adhesion.
Blushing

Blooming, Color Change

Description
A milky white haze or mist formed on the surface of the paint film.

Cause
Moisture condensing on, and being trapped in the wet film. This may be due to:

a. Spraying during the cold, wet or humid weather.
b. Use of too fast or poor quality thinner.
c. Compressed air pressure onto the film to speed up solvent release.
d. Draughty paint shop, or inadequate heating and / or air movement.
Blushing

**Prevention**

a. If possible, avoid spraying air drying paint during rainy or exceptionally cold or humid weather. If this is unavoidable, a non-bloom thinner should be used.

b. Use the correct grade of thinner.

c. Reduce compressed air pressure to minimise the cooling effect.

d. Allow solvent release to take place naturally.

e. Ensure that the paint shop is adequately heated, properly ventilated and free from draughts.

**Rectification**

Slight blooming may be removed by the use of polishing compound, after the paint film has hardened, or by spraying the affected area with non-bloom thinners.

In more severe cases, rub down the surface, and repaint using the correct grade of thinner or non-bloom thinner.

If these remedies fail to correct the fault, raises the temperature of the paint shop by a minimum of five degrees, avoid all direct draughts, flat and repaint the affected area.

**NOTE:**

Blooming of the color coat may indicate that the undercoats have been similarly affected, the defect having gone unnoticed due to their matt finish. This may subsequently give rise to blistering or loss of intercoat adhesion.
Paint Defect Diagnosis

Bridging

Description
Paint film cracked around sharp edges (e.g. masking tape edge, joint or groove where body and guard meet). At times, the film may 'tighten' across an acute angle and separate from the substrate without cracking.

Cause
a. Insufficient sanding around joints, mouldings etc. resulting in lack of adhesion.
b. Too heavy a build up of material on these areas.

Prevention
a. Detailed sanding around suspect areas.
b. Eliminate heavy build up of material around sharp edges, corners and mouldings.

Rectification
If bridging has occurred, remove finish from affected area, detail sand and refinish, spraying thinner coats and leaving extended drying time between coats.
Description
This defect is peculiar to certain blue, maroon and black pigments. It is formed by a loosely adhering pigment layer in the surface which is slightly different in color from the original paint, and which imparts a metallic sheen to the surface.

Cause
a. Certain pigments will show slight bronzing in any paint vehicle, and the painter has no control over this condition.
b. Recommended mixing formula not followed. Certain pigments will show bad bronzing if an upper limit is exceeded in the paint.
c. Hot spraying of some reds or maroons.

Prevention
a. Follow the recommended mixing formula.
b. Some reds or maroons may have to be sprayed cold.
Paint Defect Diagnosis

Bronzing

Color Change

Rectification

a. Light hand polishing with a mild liquid polish will remove the bronze. Frequent washing and an occasional polish will maintain good appearance.

b. In severe cases, wet flat the color then respray.
Description
A chalky dusting or powdering at the paint surface, often associated with old, weathered paint film.

Cause
Precipitation of elements within the paint.
This may be due to:
  a. Incompatible or defective materials within the paint.
  b. Degradation of the binding agent.
  c. Degradation of pigment.

Prevention
  a. Use recommended materials.
  b. Avoid exposure to ultra-violet light (strong sunlight) and harsh shampoos.

Rectification
Flat, compound and polish the surface to restore the gloss. In severe cases repaint the topcoat.
Paint Defect Diagnosis

Contamination

Description

Spots, speckles or splash-like deposits on, or discoloration and staining of, the paint surface. The surface may have greasy or tacky spots, be coated with particles, or feel gritty.

Cause

Foreign substances or chemicals adhering to, or becoming embedded in the paint. Common sources are:

a. Tree sap and resins, wet leaves, berries, fruit or bird droppings allowed to remain on the paint.

b. Metallic particles becoming embedded in the surface of the paint and oxidising.

c. Salt deposits resulting from the evaporation of liquids on the surface. These may also lead to blistering.

d. Cement or other chemically active dust.
Paint Defect Diagnosis

Contamination

*Airborne Contamination, Cement Dust, Contamination, Fall Out, Industrial Fallout, Rust Specs, Specs, Spots*

**Prevention**

a. Do not allow any deposits to remain on the paint surface.

b. Ensure the paint film is fully cured.

c. Store vehicles under cover and away from possible sources of contamination. Take special care not to expose new paint finishes to environments likely to cause contamination.

d. If an oven or drying room is used ensure that the filtration system is working properly, and that no industrial fumes enter the room.

**Rectification**

Light staining may be removed by washing the surface with a mild detergent solution, followed by washing with a 10% Oxalic acid solution to remove ferrous compounds. Rinse, compound and polish to restore the gloss. If discoloration and staining persist, rub down the surface and repaint.
Paint Defect Diagnosis

Corrosion

Rust under Film, Rusting

Description
Loose paint, bubbling and discolouration of the paint film, especially around body fittings, panel edges and seams.

Cause
Corrosion of the metal substrate, resulting in loss of adhesion of the paint. This is frequently caused by:

a. Exposure of bare metal surfaces by accidental damage, or by leaving drilled holes untreated.
b. Exposure of bare metal surfaces due to destruction of the paint film by contamination.

Prevention

a. Ensure that all metal surfaces are treated with the correct metal treatment fluids and etch primer prior to painting.
b. Repair any damage to the paint film as soon as possible. Always treat any newly exposed metal edges immediately.

Rectification
Strip the paint from the affected area down to the bare metal, remove all existing corrosion, treat the surface with the correct metal treatment fluids and etch primer, and repaint.
Cracking

Description
Random breaks or crevices in the paint film, often adjacent to filled seams or panel edges. Cracks frequently take form of a three pointed star. The depth of penetration of the paint film varies, severe cracks may penetrate to the substrate.

Fine cracks of splits may occur at the featheredge of a spot repair shortly after the application of the topcoat.

Cause
Weakness such as blistering being exaggerated by weathering, or magnification of stresses normally present in the paint film. These stresses are increased by:

a. Inadequate mixing of materials prior to application, insufficient thinning of the wrong grade of thinner.

b. Poor preparation of the surface; too coarse abrasives, inadequate cleaning or poor seam filling.

c. Contamination by oil or water in the air line.

d. Excessive film thickness and insufficient drying time between coats, cold air fanning causing the surface to dry over trapped solvent.

e. Substrate too hot or too cold during spraying

f. Application of thermosetting topcoat over partially cured paint film or thermoplastic acrylic topcoat.
Paint Defect Diagnosis
Cracking

Splitting

Prevention

a. Always mix paint thoroughly, and use the correct amount of recommended thinner.

b. Prepare the surface carefully, using the correct grade of abrasives. Ensure that seams are correctly filled. Clean surfaces thoroughly, paying special attention to feather edges.

c. Always maintain compressed air equipment properly.

d. Use correct spraying techniques. Apply paint in thin, wet films and allow adequate drying time between coats.

e. Ensure that the surface is within the recommended temperature range before commencing spraying.

f. Isolate the thermoplastic acrylic with a light coat of epoxy primer.

Rectification

In minor cases, where only the topcoat is affected, sand down to a sound finish and repaint.

If cracking has penetrated the primer, strip all paint from the affected area, ensure that any defects in the substrate are corrected and repaint.
Paint Defect Diagnosis
Crazing

Alligatoring, Checking, Crocodiling, Crows Footing, Hair Lining

Description
Appears to the naked eye as a loss of gloss, close examination under low magnification reveals a large number of minute cracks.

Cause
Excessive stresses in the paint film due to:

a. Inadequate mixing of materials prior to application, insufficient thinning or the wrong grade of thinner.
b. Excessive film thickness, colour coat applied over inadequately dry or excessively thick under coats.
c. Incorrect use of additives.

Prevention

a. Always mix paint thoroughly, and use the correct amount of recommended thinner.
b. Use correct spraying techniques. Apply paint in thin, web films and allow adequate drying time between coats.
c. Only use approved additives.
Paint Defect Diagnosis

Crazing

Alligating, Checking, Crocodiling, Crows Footing, Hair Lining

Rectification

Sand the affected area down to a sound, smooth finish and repaint.
Paint Defect Diagnosis

Dull Finish

Abnormal loss of gloss, Color Change, Deadening, Dulling Back, Fading, Hazing, Loss of Gloss, Low Gloss, Poor Gloss

Description
Although apparently smooth and evenly applied, the surface lacks shine.

Cause
Microscopic roughness of the surface, which may result from:

a. Poor hold out of primer, or the application of topcoat over primer which is not thoroughly dry.
b. Poor quality or incorrect thinner, or the use of additives in the paint.
c. Incorrectly prepared or poorly applied paint.
d. Application over a poor substrate
e. Excessively slow drying due to high humidity or low temperature.
f. Solvent fumes or exhaust gases attacking the surface.
g. Surface contamination by wax, grease, oil, soap or water.
h. The use of strong detergents or cleaners on a newly painted surface, compounding too soon after painting or using compound which is too coarse.
Paint Defect Diagnosis

Dull Finish

Abnormal loss of gloss, Color Change, Deadening, Dulling Back, Fading, Hazing, Loss of Gloss, Low Gloss, Poor Gloss

Prevention
a. Use an approved primer, and allow to dry thoroughly before applying the topcoat.
b. Use only recommended thinner and approved additives.
c. Ensure that the paint is stirred thoroughly, apply under the correct conditions using proper spraying techniques.
d. Prepare the substrate thoroughly.
e. Ensure that the paint dries under warm and dry conditions.
f. Ensure good, draught free air over surfaces whilst drying.
g. Wipe the undercoat with solvent and dry thoroughly before applying the topcoat.
h. Avoid using strong detergents or cleaners on newly painted surfaces. Do not compound paint until thoroughly hard and always use the correct grade of compound.

Rectification

Normally the shine may be restored by rubbing down with abrasive compound and polishing. If the dulling is too severe for this to yield satisfactory results, rub down the topcoat and repaint.
Description
Cracking around the edges of a feather-edge repair.

Cause
a. Too much or poor quality thinner or reducer.
b. Improper substrate preparation brought about by using coarse papers on feather edges with resultant attack by solvents from the following paint coatings.
c. “Piling-on” in heavy wet coats.
d. Effect of an old finish or previous repair.
e. Poor shop temperature (too cold).
f. Fanning with air to dry.
g. Fast flash time between coats.
Paint Defect Diagnosis

Feather Edge Cracks

**Prevention**

a. Choose correct thinning ratio and use specified thinner.
b. Use fine papers to feather edges of repair.
c. Do not apply in heavy wet coats.
d. Ensure new top coat is compatible with substrate underneath.
e. Heat shop area or substrate being painted.
f. Do not fan with air as this causes surface drying only.
g. Allow recommended flash times between coats.

**Rectification**

To eliminate feather edge cracking, sand to a sound, smooth finish and refinish.
**Paint Defect Diagnosis**

**File Marks**

**Description**
Heavy file marks showing through topcoats.

**Cause**
Deep scars left by coarse files without sufficient filling from undercoat and putty applications.

**Prevention**
Sand file marks with an orbital sander, or wet or dry paper to eliminate deep gouges.

**Rectification**
Fill with adequate applications of undercoat and stopper. If file marks are already showing, sand to smooth surface and refinish with undercoat, apply stopper, undercoat gain, then spray topcoats.
Flaking

De-lamination, Inter-coat Adhesion Failure, Peeling, Poor Adhesion, Poor Bond, Shelling

Description
The paint lifts from its underlying surface in smooth flakes. These flakes may be easily broken, with a tendency for the edges to peel away from the surface.

Cause
Loss of adhesion between a layer of paint and its underlying surface. This may be caused by:

a. Contamination of the underlying surface by wax, grease, silicone, oil, release agents, water, corrosion or soap.

b. Incorrect or non-use of metal conditioner on steel or aluminium surfaces.

c. Inadequate keying of the surface.

d. Surface too hot or too cold when sprayed.

e. Use of the wrong primer process, primer not properly dry.

f. Incorrect viscosity of paint, use of wrong or poor quality thinner, compressed air pressure too high.

g. Paint film applied too thickly.

h. Build up of stress between two adjacent layers of paint.
Flaking

De-lamination, Inter-coat Adhesion Failure, Peeling, Poor Adhesion, Poor Bond, Shelling

Prevention

a. Ensure that the surface to be painted is scrupulously clean. Always dry the surface with clean cloths.

b. Always use the correct metal conditioner on steel or aluminium surfaces. Commence spraying within 30 minutes of preparation to avoid the onset of corrosion.

c. Sand the surface properly before spraying, taking care to remove all sanding dust.

d. Ensure that the surface is within the recommended temperature range during spraying and drying.

e. Use the correct primer process, and ensure that the primer is properly dry before continuing painting.

f. Thin the paint to the correct viscosity, using only recommended thinner. Set compressed air pressure as low as possible consistent with proper atomisation.

g. Apply paint in thin, wet layers.

h. Use a range of products by a single paint manufacturer.

Rectification

Remove the detached paint from the affected area. Prepare the underlying surface correctly and re-paint.
Paint Defect Diagnosis

Mapping

*Contouring, Laking, Shrinkage, Sink Back, Sinkage*

**Description**
Areas of the surface with a differing texture or degree of gloss, surrounded by clearly defined boundary or contour lines.

**Cause**
Filler or stopper incorrectly mixed, or not properly finished, primed or sealed.

**Prevention**
Mix filler or stopper correctly, apply and finish carefully and correctly.

**Rectification**
Rub down the affected area to a sound surface, refill or stop if necessary and prime or seal thoroughly.
Panel Faults

Disc Marks, Poor Metal Finish, Rippling, Weld Spatter, Weld Splash

Description

Surface irregularities, typically appearing as ripples, curved, straight or crissscrossed grooves, or jagged or globular protrusions.

Cause

Conformation of the paint film to surface defects of the substrate. These may be due to:

a. Press or mould irregularities, poor surface finishing of the substrate, too coarse abrasion by file or disc, weld spatter.

b. Poor or insufficient filling or stopping, incorrect stopper, inadequate flatting.

c. Insufficient application of primer.

d. Applying color over improperly dried high build primer.
Paint Defect Diagnosis

Panel Faults

Disc Marks, Poor Metal Finish, Rippling, Weld Spatter, Weld Splash

**Prevention**

a. Examine the surface carefully before spraying, and correct any defects and irregularities. Use the correct grades of abrasive, use files or discs correctly, remove all weld spatter.

b. Fill or stop all defects, use the correct stopper, flat down correctly.

c. Apply an adequate thickness or primer and flat to a smooth surface.

d. Allow materials to dry or cure properly.

**Rectification**

Strip paint down to the substrate. Correct all defects, prepare the surface correctly and repaint.
Pinholing

**Description**
Small cavities, generally less than 1mm in diameter, occurring over stopper, filler or GRP substrate.

**Cause**
Absorption of the paint into holes in the substrate. This is due to:

a. Air inclusions in GRP resin.
b. Inadequate preparation and sealing of the substrate.
c. Poor quality filler or stopper.
d. Poor mixing of filler, poor application of filler or stopper.

**Prevention**
a. Heat to above spraying temperature prior to preparation to burst inclusions. Do not heat above 80°C to avoid distortion of the surface.
b. Inspect GRP surfaces and filled or stopped areas carefully. Stop any pinholes, spot prime and flat until smooth before priming the complete surface.
c. Use only recommended materials.
d. Mix filler correctly, apply filler and stopper in thin, smooth layers. Allow to harden fully before applying further layers and before rubbing down.
**Rectification**

Rub down the affected area to the primer, stop any pinholes, spot prime and flat until the surface is smooth, then repaint.
Paint Defect Diagnosis
Polishing Marks

Description
Microgrooves or smears on the surface of the film, typically in a curved or swirling pattern. Underlying layers may show through.

Cause
Abrasive damage to the paint film due to:
   a. Compounding or polishing the surface before fully hardened.
   b. Excessive pressure or speed of mechanical polisher.
   c. Use of too coarse or ammoniacal compound or incorrect polish, dirty or coarse polishing cloth or mop.

Prevention
   a. Allow surface to harden fully before compounding or polishing.
   b. Use mechanical polishers at minimum pressure and correct speed.
   c. Use the correct grade and type of compound and polish, ensure polishing cloths or mop are soft and clean.
Rectification

Allow the surface to harden fully, flat compound and polish. In severe cases, flat and repaint the surface film.
Paint Defect Diagnosis

Poor Color Match

Miss Match, Off Color, Off Shade

Description
Adjacent areas exhibit differences in shade. This is most frequently noticeable on adjacent complete panels.

Cause
There is no single cause, the defect may result from a number of factors:

a. Use of differing or incorrect materials.
b. Inadequate mixing of the paint.
c. Fading due to weathering or exposure.
d. Incorrect application.
e. Metameric distortion (Color variation in differing light).
f. Incorrect colour choice or use of the wrong variant of the color.

Prevention

a. Use only recommended materials
b. Ensure that the paint is mixed thoroughly and correctly.
c. Protect vehicles in storage.
d. Apply materials correctly, use correct spraying technique.
e. Before painting the vehicle, spray a test panel with the paint to be used and compare with the original at different angles and in differing light.
f. Use the manufacturers color system to select the correct color and variant.

Rectification
Flat down the surface and repaint using the correct color and variant.
Paint Defect Diagnosis

Sanding Scratches

Flatting Marks, Scratch Opening, Scratch Swelling, Scratches

Description
Surface scratches under the paint film.

Cause
Shrinkage of the paint film during drying causes it to follow the contours of any scratches or other finishing marks in the underlying surface. The defect results from:

a. Poor finishing of the underlying surface, abrasives too coarse, inadequate flatting, inadequate stopping
b. Color coat applied before the primer is properly hard.
c. Insufficient paint thickness, or a too slow drying rate.
d. Incorrect mixing of paint, use of wrong or poor quality thinner.

Prevention

a. Use the correct grade of abrasives, use stopper on any deep scratches, flat the surface to a smooth finish.
b. Ensure that the primer is fully hardened before applying the colour coat.
c. Apply the correct paint thickness, under correct drying conditions.
d. Mix the paint thoroughly, using only recommended thinner.
**Rectification**

If the marks are light it may be sufficient to flat, compound and polish the affected area. In more severe cases the surface must be rubbed down until the marks are removed and then repainted.
Paint Defect Diagnosis

Solvent Popping

*Pinholing, Pop-ups, Popping, Pops, Solvent Boil*

### Description

Open topped blisters up to 1 mm in diameter on the surface of the most recently applied paint film.

### Cause

Air or solvent vapour trapped by fast drying paint forming a skin. This may be due to:

a. Poor quality or too fast thinner.

b. Excessive film thickness, or insufficient drying time between coats.

c. Compressed air pressure too low.

d. Drying temperature too high, heat source too close to the film, too hot, or applied too soon.
Paint Defect Diagnosis
Solvent Popping

Pinholing, Pop-ups, Popping, Pops, Solvent Boil

Prevention
a. Ensure that the surface is scrupulously clean.
b. Use only recommended thinner.
c. Apply paint in thin, wet films. Allow sufficient drying time between coats.
d. Use correct compressed air pressure.
e. Allow sufficient flash off time before force drying, ensure that the correct drying temperature is not exceeded.
f. Do not allow the heat source to be placed too close to the surface.

Rectification
Rub down to a smooth surface and repaint.
Description
Damaged and broken paint film, varying in depth and extent depending on the cause.

Cause
Impact damage, typically caused by stone thrown up from loose road surfaces, or scratching by sharp objects.

Prevention
Damage caused on the road may be unavoidable, but care should be taken to protect vehicles in storage, in the paint shop or in transit.

Rectification
Rub down the affected area, feather the edges of the chips, restore the level with stopper and repaint.
Paint Defect Diagnosis

Water Spotting

Water Marking

Description
Circular marks, normally up to 6mm in diameter, on the surface of the paint film. The marks are usually lighter in colour than the surrounding surface.

Cause
Water droplets impacting on, and evaporating from, the surface. The marks may result from:

a. Exposure of the paint film to rain or water splashes before it has fully hardened.
b. Rain or water splashes on an excessively thick film of wax polish.

Prevention

a. Protect paint surfaces from water until fully hardened.
b. Do not allow excessive wax build up on the surface.

Rectification

Dewax the affected area, flat lightly, compound and polish, repeating if necessary. In severe cases repaint the topcoat.
Wax Incorporation

Smears, Wax Impregnation, Wax Retention, Wax under Film, Wet Spots

Description
Smears or dull areas in the paint film. The affected areas may feel greasy.

Cause
Absorption of wax into the paint film due to:
- Application of wax polish before the paint has fully hardened.
- Excessive or incorrect use of polish or compound.
- Poor polishing technique.
- Storage of wax protected vehicles under hot conditions.

Prevention
- Allow the surface to harden fully before polishing.
- Use only recommended products, use as instructed.
- Use correct polishing techniques, ensure that the gloss level is even over the entire surface.
- Protect stored vehicles from excessive heat.
Paint Defect Diagnosis

Wax Incorporation

Smears, Wax Impregnation, Wax Retention, Wax under Film, Wet Spots

Rectification

Apply a solvent cleaner, followed by polishing with a non-wax polish. Repeat until all wax has been bled from the surface, then repolish.