

Gel Coat Troubleshooting Guide

Proper gel coat application is difficult for professionals and is probably the most common problem area for those new to fiberglass work. Most common gelcoat problems are related to temperature variation, catalyzation and a variety of handling techniques. The following list of gel coat problems and causes should help to resolve some of the difficulties associated with gel coat.

1. Wrinkles And Pinholes

A coating less than five mils thick may wrinkle, especially when brush marks are present. Check the thickness using a gel coat thickness gauge. The preferred thickness is .010" to .020".

A wrinkle can also occur if the gel coat is not cured enough prior to lay-up. Before lay-up check the surface for tack. The surface should be sticky but not transfer to your finger. Several things can affect a slow cure; solvent or water entrapment, under catalyzation, cold temperatures and other factors.

If the gel coat film contains pinholes, check the spray equipment for moisture in the air lines or dirt in the traps. It is also important to review your spray techniques.

Potential Problem: Wrinkle

Nature of Defect : reinforcement

Possible Causes :

- Improper lay-up
- Too rapid cure
- Use of old resin
- Fold in release film on the mold

Potential Problem: Pit or Pinhole

Nature of Defect : Small regular or irregular crater on surface, usually with nearly equal width and depth

Possible Causes :

- Air bubbles that rise to surface which cure before smoothing out



2. Slow Gel Coat Cure

Any temperature below 70 degrees F will retard the gel time. An under-catalyzed gel coat will also result in a slow cure but this is not a recommended technique for deliberately lengthening gel time. High moisture and humidity will lengthen the gel time.

3. Sagging Of The Gel Coat

The most common reasons for gel coat sags would be when the gel coat is applied in an excessively heavy application in one or more passes. To avoid sagging, spray in multiple light coats at a 15" distance from the mold. The maximum thickness to be sprayed at one application is .016".

4. Porosity

Gel coat porosity (air bubbles) is normally caused by trapped air or moisture. This can be prevented by limiting the spray thickness per pass to .005". It is also important to verify that the proper air pressure is being used because an over pressurized spray can cause fine porosity. Air pressure should be set at thickness of the gel coat. It is also important to avoid any spray overlap areas. 40-80 PSI, depending on viscosity.

5. Separation Of Color

Most color separations are related to improper spray techniques. Reduce or lower thinning agents and lower the per pass thickness of the gel coat. It is also important to avoid any spray overlap areas.

6. Discoloration On Finished Parts

This problem is caused from porosity related to air entrapment while spraying. This can be overcome by spraying the mold surface with several light passes. It is also important to bleed any moisture from the air lines and to be sure that the mold surface is dry.

7. Craters And Pock Marks

These surface blemishes can be caused by improper resin to catalyst ratios and improper air pressure both high and low. Another cause for craters would be oil or moisture on the surface of the mold.

8. Fisheyes

Fisheyes are usually caused by contaminants on the mold like dirt, moisture or oils. Bleeding the air lines and using air filters will lower any air related contaminants. Try to isolate the spray area from any oils, especially silicones.

Potential Problem: "Fisheye"

Nature of Defect : Small globular mass not blended into surrounding material, particularly evident in transparent or translucent materials

Possible Causes :

- Dirty surface
- Foreign matter falling on resin

9. Blisters When Immersed In Water

Blisters can be caused for the following reasons:

- Incomplete cure.
- Improper wetting of the back up fibers.
- Bad bond between the gel coat and the back up laminate. This is often caused by contamination.
- Thin gel coat.

10. Lifting Of Gel Coat Before Laminating

This condition is usually related to shrinkage of the gel coat. Shrinkage can be caused by:

- Too fast of a curing time normally caused by over-catalyzation.
- Delays between the gel coat and laminating can cause shrinking.
- Variations in gel coat thickness can vary the gel time which can cause shrinkage.
- The mold surface is too hot.

11. Back Up Pattern Showing Through Gel Coat

This visual pattern is caused by too low a gel coat thickness or the gel coat was not properly cured.

12. Gel Coat Sticking To The Part

This condition is caused by improper releasing of the mold surface. It is important to use release agents formulated for the reinforced plastics industry. Proper training and common sense will eliminate most of the problems associated with gel coats. Proper handling of gel coats will result in a part with a blemish free surface.

Potential Problem: Air Bubbles, Voids

Nature of Defect: Air entrapment between plies, non-interconnected spherical voids

Possible Causes:

- Whipping action during mixing
- Poor or dirty surface
- Air bubbles not rolled out during lay-up

Potential Problem: Blisters

Nature of Defect: Rounded, sometimes sharply defined elevations of laminate surface

Possible Causes:

- Cure too rapid
- Moisture in resin, filler or glass

Potential Problem: Impact Cracks

Nature of Defect: Separation of materials through thickness and visible on surface

Possible Causes:

- Impact
- Insufficient reinforcement

- High concentration of resin

Potential Problem: Crazing

Nature of Defect: Pattern of fine cracks on or beneath surface

Possible Causes:

- Isolated resin-rich area
- Impact
- Intermittent service causing temperature differences
- Wet / Dry cycling
- Resin shrinkage

Potential Problem: Delamination

Nature of Defect: Separation of layers

Possible Causes:

- Poor glass saturation
- Dirty surface
- Glass content too high
- Failure to remove air-inhibition coat before adding layer

Potential Problem: Dry spots

Nature of Defect: Area of reinforcement not wetted with resin (usually at laminate edge)

Possible Causes:

- Not enough resin used, applies mostly to molding operations

Potential Problem: Pimple

Nature of Defect: Small, sharp or conical pimple-like elevation on surface

Possible Causes:

- Dripped resin or small bubble
- Worked on area after resin has started to cure

Potential Problem: Resin pocket

Nature of Defect: Apparent accumulation of excess resin in a small, localized area

Possible Causes:

- Improper lay-up in which glass separates and voids fill with resin

Potential Problem / Defect : "Scratch"

Nature of Defect : Shallow mark, groove, furrow or channel

Possible Causes : (Improper handling or storage)