Glue Chipping – Innovative Decorative Glass Production

System properties and advantages

- Innovative new process
- For sandblasted glass
- Numerous decorative possibilities
- Easy handling
- UV system technology
- Ideal for manual and industrial production
- Tempering possible
Glue chipping – the innovative new technology for producing decorative glass

Glue chipping is an innovative process for decorating sandblasted glass. Two products are available for different applications.

1. A screen or other shape is applied to the satinised glass surface with QuickChip88®. Application can be either automatic or by hand, for example using a specially created drawing template. It is then UV cured.

2. With QuickChip88GEL® a form can be precisely contoured and filled on a substrate, whose thickness depends on the application and desired result. The gel can also be used on three-dimensional objects or vertical surfaces, including ready fitted parts, providing almost unlimited possibilities. It is then UV cured.

The mass – which has an exceptionally high adhesion to glass – is then cured, which triggers a chemical process that causes the mass to shrink. The shrinkage in turn generates tensions in the glass surface that cause localised cracking.

The way in which the cracks form can be carefully controlled with various parameters. The resulting glass chips can be removed, leaving behind transparent recesses in the surface.

Factors affecting the result

- Type and pretreatment of glass surface
- Coating thickness of the substrate
- Intensity of the UV radiation
- Duration and type of temperature after treatment (for example cooling)

Glue chipping with UV light

Introduction

The adhesive utilized for glue chipping glass has remained the same since its inception: animal hide glue. The techniques required for successful chipping with animal hide glue has cause glue chipping to be viewed as more of an art than a process. The introduction of QuickChip88 offers glass artists and glass manufacturers an easy and ready to use, one part adhesive that upon exposure to UV light will duplicate the results obtained with animal hide glue. The process takes minutes to complete. With the development of QuickChip88Gel it is possible to glue chip 3 dimensional objects such as vases, bowls, pitchers and sculptures. The possibilities are limited by one’s imagination.

Considerations

Although it has been our goal to transform glue chipping into a reproducible process it is important to realize that each individual glass piece that is subjected to this process will be unique: no two pieces will ever be identical. This paper is presented as a means of guidance and to help users identify variables that will influence the results obtained with QuickChip88 and QuickChip88Gel. The variables we identify in this paper should not be thought of singularly; the final chip pattern will be dependent upon the sum of the variables.

Glass surface preparation

As with the original glue chipping process the glass to be chipped must be roughened by sandblasting. The glass should be cleaned after sandblasting to remove residual sand and possible contamnates. The glass should be dry.

Properties of the glue chipping adhesives

- Low odor
- Excellent adhesion to glass
- Fast UV-curing
- High shrinkage
- Glass chipped by the Quickchip process can be tempered

QuickChip88® can be applied straight from the bottle in any layer thickness – here over a previously applied drawing – before being UV-cured.

For a sharp delineation, fill contours with QuickChip88GEL® before UV-curing. Also suitable for 3D-forms and vertical surfaces.

After curing and cooling the substrate is scraped off. To create individual patterns, the substrate can be lightly struck before removal.

This new technology presents almost unlimited possibilities for applying decorative detail to windows, doors and other glass objects. A creative challenge in the production of handmade glass, glue chipping is also suitable for automated, industrial-scale production of decorative glass.
Applying the QuickChip88

QuickChip88 and QuickChip88Gel are supplied ready to use; no cooking or mixing is required. Simply apply the adhesive to the area to be chipped by whatever means is most convenient. The amount of adhesive applied will have great effect on the final chip pattern. The two easiest ways to control the amount of adhesive are (1) adhesive weight and (2) wet coating thickness.

After gaining some experience glue chipping with QuickChip88 one will develop a feel for how much adhesive is required for the desired effect. Two other important considerations are the area being chipped and the thickness of the glass.

Because of the great heat generated upon curing and the stress built up in the adhesive as it cools, large areas and/or thin glass require extreme care to avoid breaking the glass.

If the adhesive weight method is utilized it is important to have an idea of the surface area being chipped. The smaller the area being chipped the less important this measurement becomes. At some point this measure becomes very important. The thickness of the glass figures prominently into this calculation. The following data was derived using 3/16 inch thick float glass and is offered as guidance.

Fine chip pattern

To achieve a chip pattern that most closely duplicates the pattern obtained by animal hide glue a coating weight of between 0.6 and 0.85 grams/in² is recommended. This coating weight would translate to a wet coating thickness of about 50 mils. These weights should be reduced if areas greater than 2 ft² are being chipped. If very small areas (less than 2 in²) are to be chipped a greater coating weight might be required.

Normally the adhesive will generate enough internal stress to self-chip: no action is required. Chipping should occur within 45 minutes. Sometimes, when using these coating weights it becomes necessary to initiate the chipping process by lightly striking the cured adhesive with a razor knife.

This should be done very cautiously as a great deal of stress will be present in the adhesive. It may be necessary to scrape the surface of the chipped area with a razor blade to assure all glass and adhesive has been removed.

Large chip pattern

To obtain a pattern that is similar to double or triple glue chipped glass a coating weight of between 1.0 and 1.5 grams/in² is used. This coating weight would translate into a wet film thickness of about 75 mils.
Because of the heat and stress generated by this amount of adhesive, these coating weights are not recommended for areas greater than 2 ft². This high coating weight typically does not require any initiation to begin the chipping process; enough stress is formed inside the cured adhesive film to selfinitiate the chipping process.

Chipping normally occurs within 30 to 45 minutes. Usually no action is required to bring about chipping. As mentioned in previous sections it might be necessary to initiate chipping by lightly striking the cured adhesive film with the tip of a razor knife. After the adhesive has fractured it is recommended that the part be allowed to continue to cool for an additional 30 minutes. Most of the fractured adhesive should be easy to remove. It is common for the adhesive on the edges of the piece to be more difficult to remove.

If the part has been masked as in Figure 4 the edges are easily removed: a razor knife can be used to remove the masking tape and cured adhesive. The finished piece is 8 inches by 11 inches. A coating weight of 0.89 grams/in² was used.

Selfinitiation should occur within 30 minutes of UV curing the adhesive. Extreme care should be taken should chip initiation using a razor knife be considered for large areas with a high coating weight. There will be a great deal of stress in the adhesive and there is a very real chance that the glass will shatter. It is not uncommon for a small amount of adhesive to be firmly stuck to the extreme edge of the chipped area.

This adhesive might even be extremely sticky. This material should be removed using a razor. As with the lower coating weight, it might be necessary to scrape the surface of the chipped area with a razor blade to assure all the glass and adhesive has been removed.

Curing the adhesive

QuickChip88 and QuickChip88Gel must be cured using UV light of suitable intensity. The UV energy available from black lights is not sufficient for use with QuickChip88 or QuickChip88Gel.

A wide range of UV-curing equipment is available that is suitable for glue chipping with QuickChip88 and QuickChip88Gel. The amount of time required to cure QuickChip88 and QuickChip88Gel depends upon the energy output of the lamp and how close the adhesive is to the light source.

As a minimum a UV lamp capable of 50mW/cm² fitted with a parabolic reflector (flood type lamp that generates collimated light) is recommended. With most UV flood lamps an exposure of 1 to 3 minutes is required to fully cure the adhesive. Because relatively thick films of adhesive are being UV cured there will be a great deal of heat produced; this is normal for this process. There will also be some gases liberated upon curing. It is recommended that curing be conducted in an area with good ventilation.

The chipping process

As the adhesive cools it becomes harder and great stress is built up within the film. Eventually the stress fractures the adhesive film. The adhesive has enough adhesion to the sandblasted glass that when the film does shatter pieces of glass are pulled from the surface of the part being chipped.

Because of the heat and stress generated by this amount of adhesive, these coating weights are not recommended for areas greater than 2 ft². This high coating weight typically does not require any initiation to begin the chipping process; enough stress is formed inside the cured adhesive film to selfinitiate the chipping process.