



Reverse Engineering

Reverse Engineering has been defined as, “Taking an object apart to see how it works in order to duplicate or enhance the object.” It’s something many glass artisans do as part of their learning experience and something all glass artisans, whether amateur or professional, should do. Sadly, too few are willing to make the effort but instead look for a tutorial to explain how to make something they would like to copy rather than try to teach themselves by practicing reverse engineering.

This is probably the best of all ways to expand your personal skills. It not only helps you understand the process of different techniques but encourages you to analyze how projects are done and examine how combining different techniques creates different effects. Just as being good at crossword puzzles requires you have a good understanding of the meanings of different words being good at reverse engineering glass art requires you have a good understanding the different ways glass responds to heat. Practicing reverse engineering is an excellent way to improve your understanding of how different glass art effects are created.

Personal Challenge

This is something you should undertake as a personal challenge. It’s a process of self education. When you look at something someone made or a photo of something made, try to figure out how it was made. But, don’t just try to figure out how it was made. Try also to figure out other ways it could have been made. Study it and mentally take apart. Build it backwards. Then think about ways to build it in different ways. As with all skills, the more you practice reverse engineering the better you get at it. Perhaps it should be a key part of the education program for every glass artisan?

Analyse

When you think you have figured out how it was done, take a moment and review your opinions. Ask yourself:

- Is your analysis correct?
- Have you made assumptions that might not be valid?
- Are you assuming this project was done using traditional techniques?
- Are there reasons those techniques would not have worked?
- Are there some other ways it could have been done?
- Could it have been done with different materials.
- Does it matter what order the project is done in?

Practice

Practicing reverse engineering is an exceptional way to expand your personal and understand of glass art techniques. It not only helps you understand the different processes but encourages you to apply logic and reason to understand cause and effect in glass art.

For you to practice here are some samples for you to examine. Some are relatively conventional but others include using some more unusual techniques. Study the photo and build it backward to figure out how it was done. There might be just one way or there might be several different ways to achieve the same result.



Donut Bowl



Donut Bowl explained

Pebbles

- Premade ½ inch diameter black pebbles.
- Premade assorted color 1 inch and 1 ½ inch diameter pebbles.

Fuse

- A 12 inch diameter clear glass round set onto a 12" diameter black round.
- Colored pebbles place on top.
- Black pebbles place on top of the colored pebbles.
- Fired to full fuse. A 30 minute hold is need to provide enough time to melt flat.

Slump

- The fused project slumped into a ceramic mold.

Purple Pebbles



Purple Pebbles Explained:

Assembly

- A 12 inch x 12 inch square of purple glass set onto a 12 inch x 12 inch square of clear glass.
- Assorted size premade clear glass pebbles set on top of the purple glass.

Fuse

- Fired to full fuse with 30 minute hold to allow the pebbles long enough time to fully melt in.

Slump

- Slumped into a ceramic mold – but this could also have been draped over a steel mold.

EXPLANATION

This isn't so much a special technique as understanding that when clear glass is melted into a colored glass is produces a dilute variant of that color.



“Millenium Falcon” Casting



“Millenium Falcon” casting explained:

Assembly

- A plaster/silica casting of the Millenium Falcon was made in a rubber mold bought at the dollar store. An alternative would be to make a latex or rubber mold from a toy and use it to make a plaster/silica casting.
- A 6 inch x 6 inch box built on the kiln with 2 inch tall kiln dams.
- The plaster/silica casting set in the middle of the box.
- Scrap bits of black glass pour in to about ½ inch deep.
- Copper and gold mica powder sprinkled onto the black scraps.
- The rest of the box filled with scraps of clear glass.

Fuse

- Fired to a full fuse with a 25 minute hold to ensure a full melt.

Finish

- The casting removed from the casting box.
- The plaster/silica casting removed.

Coldwork

- The glass edges ground to a full polish on a wet belt sander.

The end result is a clear image of the spaceship in a black sky with sparkling stars. In casting projects like this it's important to make the mold twice as deep as you expect the finished casting to be. As air particles between the bits of glass vent out, the molten glass drops to about half the original level.

This reverse casting technique can be used with an casting that can be trusted to survive the kiln firing and can be removed after the firing. It's important to be sure you used only materials that will not stick to the glass and the casting have a thick enough base to allow for the base color glass used. The black scraps in this project were spread out 5 to 6mm thick to be sure when they melted down there would be no spaces between them.



Comedy/Tragedy



Comedy/Tragedy explained

Casting

- A 16 inch diameter round of black glass placed in a 16 inch diameter steel mold.
- Scraps of black iridescent glass placed iridescent side up to fill the mold.
- Scraps of clear glass piled on top of the iridescent pieces with enough glass to ensure a full covering.
- Fire to full fuse with lengthy hold to full melt and spread out all the glass pieces.

Coldwork

- The glass edges ground to smooth out the texture left from the fiber paper.

Fuse

- Fired again to full fuse to round off the glass edges.

Sandblast

- Applied a vinyl stencil and blasted the desired design into the glass.

Paint

- While the vinyl sandblasting stencil is still on, brush off any grit residue and spray paint. When the paint is dry to tack, remove the stencil. The rough surface from sandblasting provides an excellent base for painting on glass.

SPECIAL CONSIDERATIONS

The black base ensures any spaces between the iridescent pieces will appear as black. If a clear base had been used, clear spaces would be seen between the pieces.

ALTERNATIVES

Instead of firing a second time to round off the glass edges, it could have been coldworked to a smooth edge. Instead of painting after sandblasting, the sandblasted design could have been painted with mica or enamels and fired to fuse.