

Crystal

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PREFACE

Crystal was a very challenging subject to write a thesis on because of the lack of information on the subject in the library or responses from the number of companies I contacted requesting their assistance.

The only written response I received was from Steuben and my only other source of information was a personal visit to the Manager of the Swarovski showroom in Palm Beach. Swarovski manufactures Austrian crystal and chandeliers. Although she was a great help to me, she confirmed our dilemma in trying to find information on crystal. Before entering into the crystal business, she too tried to research the subject in the library to better prepare herself in her new venture and discovered much to her disappointment that there was no information available on the subject.

As a result, all of the information contained in this report is due to the thanks of Steuben and the excellent material they provided me, plus their book "Steuben Glass, An American Tradition in Crystal" which I purchased for the purpose in helping me write this thesis.

ACKNOWLEDGMENT

STEUBEN

"About Steuben"

"How to Care for Steuben Glass"

"Steuben Glass, An American Tradition in Crystal"

by Mary Jean Madigan

IN APPRECIATION

Steuben Glass is an American company founded in Corning, New York, in 1903 and named after the county Steuben. Since 1933 Steuben has produced only crystal and has been chosen as gifts of state by every president since President Truman.

I wish to thank Steuben Glass for sending me the information for this thesis. I wrote to many glass companies, and Steuben was the only one to respond.

CRYSTAL

HISTORY

Glass is the most fragile and the most durable of man substances. For 3500 years glass has been made in the same way - by heating sand with an alkali such as ashes to help it melt, and with a stabilizer such as lime added to help it resist the attack of moisture. Since 1676 the finest glass, called crystal, has been made by the addition of lead. Lead gives crystal more weight, brilliance and reflective qualities than glass made without it.

In the finest lead crystal there is not the smallest trace of minerals and is therefore colorless and as pure as water.

Some of the finest glass has minute flaws in it; e.g., air bubbles called seeds, specks of matter called stones, and faint lines called cords. These flaws become apparent when the glass is held up to the light.

Steuben glass is thirty percent lead and free of seeds, stones and cords and the finest crystal made in the United States.

Steuben imports sand from Africa where the purest sand has been found to make its glass. The sand is mixed with lead, alkali, cullet (broken glass made from the same formula), and a stabilizer. The dry materials are carefully tested and weighed before mixing and then heated to 2500°F in the melting furnace, being stirred constantly with a platinum spoon. Platinum imparts no impurities to crystal and can resist the corrosive effects of molten glass.

The furnace is kept going continuously as many glass-blowers will use the same furnace. To maintain a constant level of glass quality, the melting furnace is torn down and rebuilt every two to three years. This is a four week project, during which time no glass can be made.

Every hour, twenty-four hours a day, samples of crystal are taken from the furnace to be examined by a microscope for purity. In addition to this, three times a week samples are taken from the furnace and examined by X-ray spectroscopy plus other chemical tests.

Dust will contaminate crystal; therefore, the outside areas surrounding the factory are kept damp so that air-borne dust and other impurities do not contaminate the glass.

At Steuben there are no assembly lines. All objects are handmade. Each piece is made in an individual shop composed of skilled, experienced craftsmen. Each shop is headed by a master glassmaker called a "gaffer" who works at his own "glory hold" or reheating furnace.

The design staff meets once a month to discuss ideas, works in progress, and works about to be introduced. Each designer expresses in his work his own creative imagination.

When a new design is being considered, first a drawing is made and if it has possibilities a wax, plaster, clay or crystal model is made. The model is then presented to other members of the staff.

The designer of each piece is responsible for his own creation from drawing and model stage until the glass-makers have produced a prototype which wins his approval. If it is decided to introduce the piece, the designer and the glassmaker undertake a trial production run together, during which production problems are solved and the manufacturing cost is determined. Finally, a decision to introduce or abandon the design is made. This could take anywhere from several weeks to several years.

To begin an object, a shop member called the "gatherer" brings a precise amount of molten glass from the furnace to the glory hold. This portion of glass is called a "gather." Its size is measured in seconds of pouring time. The "servitor" then forms it into a ball. During the shaping, the molten glass is repeatedly reheated to keep it in a workable condition and is continuously rotated to keep it from sagging and becoming misshapen.

After the glass is reheated three or four times, to start shaping the object a small bubble of air is blown through a tube into the gather. The glass is heated twice again and given more shape with wooden paddles and steel tongs. The shaping process helps the blower to blow out the glass evenly. He then inflates the glass with short puffs of his breath, not long blows as long puffs would explode the object. He removes his mouth from the pipe frequently and between breaths puts his thumb over the end of the pipe. The trapped air inside expands as it grows hotter and further expands the crystal bubble until the exact size is reached. Wooden and metal graphite boxes are sometimes used to help the blower to form the glass. When a number of objects are to be made and consistency is required, metal molds are used.

The key element of some designs may be the quality of spontaneity. These designs are free blown, a process which requires great control and judgment, and no two pieces are exactly alike. Free or offhand blowing requires more time than mold blowing. Metal mold blowing is very exacting. Variations are calculated in changes in the light pattern reflected to enhance the shape of the objects. .

Whatever forming method is used, when a piece is completed, the glass is then cooled down to 350-400° centigrade, placed on a belt that takes it slowly through cooler and cooler areas until it is cool enough to handle. Some pieces take eight hours to cool down. Others, particularly the solid pieces, take two or three days to cool down. The slow cooling process is necessary to avoid internal stresses developing in the glass.

After cooling, tool marks and scratches are then removed by hand polishing. Steuben does not add any artificial finish to the glass, nor do they use acid in the polishing process. The reason for this is because acid usually leaves less than a smooth surface, thereby reducing both clarity and reflectiveness. Rather, they restore the permanent natural luster the glass has as it comes from the fire.

During the polishing process, marks are removed by grinding and then the surfaces are usually ground with three grades of sand before smoothing with pumice and polishing. If any flaws remain, it is further polished with pumice and jeweler's rouge. If the flaws cannot be removed, the piece is then destroyed.

In designs that require cut planes, the accuracy of the cuts, the sharpness of the angle, and the flatness of the planes are all important elements requiring experience, skill and steady nerves.

If a piece is to be engraved, an engraver transfers the designer's drawing to the glass with a stylus. He then goes over the outline of the design with ink and covers the piece with a protective shellac. To cut the design, he works with about fifty copper wheels of different diameters and widths all of which are made with his own hands. It requires at least six years of apprenticeship to become a qualified copper wheel engraver. Some engraved works will take months to complete, representing seven hundred hours or more of meticulous and skilled workmanship.

CARE OF CRYSTAL

Cleaning

- (1) Smoke should be removed from crystal as soon as possible after a fire or a puff-back. It is suggested that lacquersal be used in removing the smoke film.
- (2) To dust, use a lint-free cloth dampened with a mild solution of ammonia and water. The dampening is important because dry dusting may cause scratches.
- (3) Crystal should be washed by hand in lukewarm water, never hot, soapy water. Never place crystal in the dishwasher. Very cold or very hot water - and particularly a rapid change from one temperature to the other - can cause thermal shock which may break the glass on the spot, or weaken it so that it may crack at a later date.
- (4) Rinse thoroughly in warm water as soap residue may damage the glass. Dry with a lint-free dishtowel.

- (5) It is very important that if you do wash champaign glasses with detergent that they are thoroughly rinsed. If the detergent is not completely removed from the glass, it will destroy the bubbles of the champaign. Some of your better restaurants will never wash champaign glasses with detergent. Instead they will hand wash the rims of the glasses very carefully with warm water and then put them into a bacteria killing rinse.
- (6) Place a perforated rubber mat or terrycloth towel in the sink and cover the faucet with a rubber strainer to avoid breakage.
- (7) To prevent a ring or cloudy film from developing on the surface of the glass, keep containers, wine decanters, bowls and vases clean by filling them to the top and by changing the contents and washing daily. If stains do appear, rub the glass with half a lemon or wash with vinegar.
- (8) To clean the inside of decanters and other vessels, fill the inside with uncooked rice or salt and shake vigorously. Do not use abrasives or polishes.

- (9) To prevent the stopper from sticking, wipe the stopper and neck of decanters after each use. If a stopper does stick, apply warm water - not hot water - to the neck of the vessel. Do not use force. If the stopper remains stuck, return the glass to the manufacturer.

Packing

- (1) In packing crystal, do not use excelsior, newspaper or other moisture-absorbing material.
- (2) Air bubble plastic wrapping or cloth is recommended. Place the plastic or cloth wrapped object in a packing box using popcorn to separate the objects, keeping all of the items at least three inches apart.

Displaying and Storing

- (1) Shelves should be covered with felt or paper so that the bare surface does not scratch the glass.

- (2) Stemware should never be stacked. It should be stored in the upright position to avoid chipping of the rims or picking up odors from the shelves.
- (3) Pieces should be spaced far enough apart so they do not strike one another.
- (4) Never swirl or slide pieces on the shelf or table.
- (5) Each piece should be lifted when moved and placed gently on the surface.
- (6) If crystal is to be stored for a long period of time, cloth or plastic wrapping is recommended.

Extra Precautions

- (1) Never place crystal in microwave or oven.
- (2) Always handle in a manner which will avoid bumping or hitting as a bump may cause a weakness which may show up as a crack long after the actual accident occurred.

- (3) Never place in a strong sunlight. Under some conditions, certain designs may concentrate the sun's rays and serve as a burning glass.
- (4) Dripless candles are recommended as molten wax may also crack glass. Never let a candle burn down to within three inches of the glass or it may crack the candlestick.

Jewelry

Careful handling is also required for all crystal jewelry.

- (1) When not wearing the jewelry, it should be kept in its special designed case.
- (2) Avoid dropping or hitting jewelry on the table or other hard surface.
- (3) Clean with a cloth dampened with a mild ammonia solution, just as any other crystal.