

Hand-Produced Product Still Reigns Supreme in Glass Industry

By GAY PAULEY
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Kalmar, Sweden—An art centuries older than Christianity shaped that prized crystal vase in your living room, the tumblers or wine glasses brought to the table on special occasions.

Visit glass factories in southeast Sweden, most of them within less than an hour's drive of this coastal town, and you come away with a whole new appreciation of glass which today we take for granted in its numerous forms—from the water glass to the mirror to the picture window to fine crystal to sculptured works in museums.

Mechanical means now make possible mass production of much of the glass which goes into the world's markets. But in many parts of Europe and a few centers in the United States—notably at Corning, N. Y., where the famous Steuben crystal is made—the hand-produced product still reigns supreme.

All Types of Glass
Swedish glassmakers produce all types of glass, but it is their crystal which has become known world-wide. Much of it is exported to the United States.

The chemist, the artist and the craftsman all combine their skills to produce that heavy crystal with its brilliance and bell-like ring when an edge is tapped sharply with the finger.

The origin of glassmaking lies with the ancients. The Swedish glass manufacturers' association, at Vaxjo, in the heart of the factory area, says it began as early as 5,000 B. C. But for 5,000 years it was used as a flexible mass, much the same as clay, to make decorative items. About the time of the birth of Christ, the industrious Phoenicians had learned how to blow glass. Glassmakers of Alexandria and later of Byzantium and Venice perfected the methods.

First Glass Melted
In Sweden, glass first was melted in 1556. Forty of the 46 glass factories of Sweden now center in the southeast part of the country where wood and water—two vital items for its production—are plentiful.

The oldest factory is Kosta, founded in 1742. It was one of three works I toured—the others, Orrefors and Strombergshyttan. All are known for high quality of workmanship and design.

Sand is the basic ingredient of glass. Sand melted with

soda ash and lime produces the common flint glass. The finer crystal consists of a melting of sand, potash and red lead.

Gives Crystal Weight
The lead gives weight to the crystal, but the red color disappears during the melting. Substances such as salt peter and arsenic, the latter a highly poisonous substance used only in minute quantities, are also added to improve the melting and purify the glass. Different types of metal oxides added to the "batch"—the factory term for the sand mixture—produce different colors. Cobalt oxide, for instance, gives a blue tint; zinc oxide, a red hue.

Paradoxically, most of the ingredients used by the Swedes are imported—the sand

coming from Germany and Belgium, the potash and soda ash coming from Germany, Belgium or France. But the lakes and rivers provide the water, basic to the moulding and cooling process, and the forests the wood to stoke the furnaces.

The melting process for a new batch of glass begins as soon as the day ends at the factory. Workers clean out the furnaces, or crucibles, of any residue—and then shovel in a new sand mixture.

Melting takes all night and by the start of the next work day, 6:15 to 6:30 a. m., has reached the thin liquid stage and 1400 degrees centigrade—from 2300 to 2400 Fahrenheit.

The "working" temperature—when the technician starts blowing—is a little lower,

about 1150 centigrade, or 1900 Fahrenheit, and the glass has the consistency of syrup.

A spokesman at Orrefors explained that blowing is done by a team known as a "chair," consisting of seven to eight men, each with one task to perform. Head man is the gaffer, or foreman, and he has had at least 15 to 20 years of blowing before he rates his job. At some factories, master blowers were in their 40th and 50th year of experience.

Most of the tools for hand-blowing glass are the same today as they were 2,000 years ago—pipe, forming block, shears, pliers, and wooden moulds.

The white hot glass is picked up from the furnace at the end of the pipe, hollow iron about one inch in diam-

eter and five feet long, much the same way a housewife twists a bit of cooking fudge onto a spoon. The bubble of glass dipped out is no larger than an egg—and the blower doesn't take out large bubbles to produce a larger piece.

The craftsman starts with the small bubble, shapes it, dips it again into liquid glass, thus adding another layer, shapes again and repeats the process until the desired size has been reached.

The same process is required if the designer wants more than one color—and sometimes you'll see three and four colors combined. Start with one shade, say clear crystal, shaping it as desired, then superimposing other layers in other colors.

The pipe onto which the

molten glass is clinging is never still—it is kept in constant motion at this stage. Otherwise it would run just like melted butter.

The glass is given its shape by the skill and lung power of the blower, who blows into the pipe as if he were producing soap bubbles, by the sizzling wooden moulds into which the glass is dipped occasionally, by one hand padded with thick layers of wet newspapers gently moulding while the other hand twirls the pipe, by the forming block, and by the crude-looking shears sending slithering strings of glass to the floor as the worker cuts the molten mixture if the product is to be open at one end.

If a stem and foot are to be added, an assistant takes a small amount of glass just

from the furnace, drops it onto the already shaped glass and shears off the amount needed. The stem and foot are shaped with the same tools.

When a piece is finished, the foreman quick-cools a rim along its base with a pair of water-dipped pliers and then, a sharp blow with the plier handles and the piece breaks off cleanly.

It now is ready for the cooling chamber. It is fed by conveyor belt into a long, tunnel-like oven heated by electricity. This oven, or lehr, holds the glass from three to four hours and removes the thermal stress.

Other processes in handling the cooled glass include smoothing rough edges of such as wine glasses by another heat process—a flame from a gas jet burner licks

the edge of each as it moves along a conveyor.

Cutting and engraving are other finishing touches. Cutting is done in stages and the design on, say, glasses for table use is marked first by a red line in the hands of another technician.

One expert does a rough cutting first, with sand and iron as the glass moves to the finished stage.

Work from Design
Engravers work from the design of artists, but between blower, engraver and artist, there is a constant collaboration. As Mrs. Eric Stromberg, widowed owner of Strombergshyttan, and its chief designer put it, "The furnace is the heart of glass. It is from there that all must work."

Engraving is done with the aid of copper wheels fed with oil and emery powder and can be anything from a simple figure cut into a cigarette box to elaborate carvings. At Kosta, I watched one engraver cutting the intricate shape of a polar bear on an ice floe into a free form block of glass.

The block was turned on its side and he was using assorted size drills working from the bottom. The technician said such an engraving took him about one full day.

At Strombergshyttan, its owner displayed a pair of sculptured horses of which she was extremely proud. The horses measured less than 12 inches each, but she said each had taken a master engraver about 300 hours. The cost of each, \$4,000.

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