

13. Facts about Glass - Early Manufacture

There are many different types of glasses, both natural and man-made. Man-made glass is created through the fusion of three main ingredients at high temperatures. The most common basic ingredient is silica. Silica has a very high melting point, about 1720 Degrees. Early glassmakers would have been unable to achieve such high temperatures therefore alkalis such as plant ash or soda were added to lower the melting point. Unfortunately the addition of too much alkali can affect the durability of the glass, increasing its solubility in water and therefore increasing the risk of corrosion. To counteract this, ingredients are added to stabilise the glass composition, usually lime or calcium oxide.

Glass is an amorphous material, this means that as the mixture cools the glass solidifies without forming a crystalline structure. This is why it breaks into unpredictable shapes when shattered unless one uses a glass cutter to

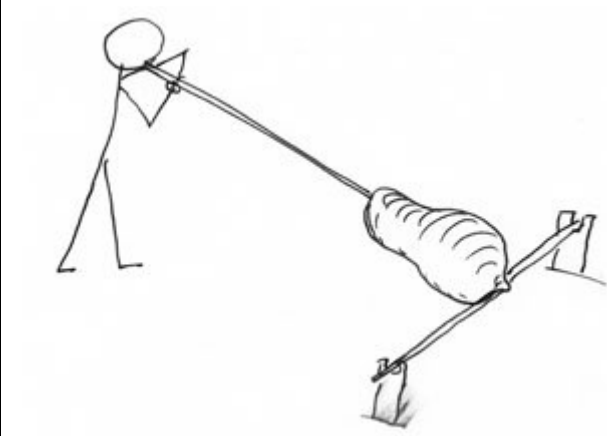
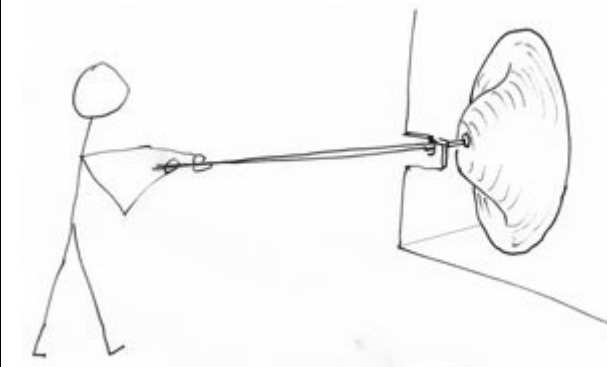
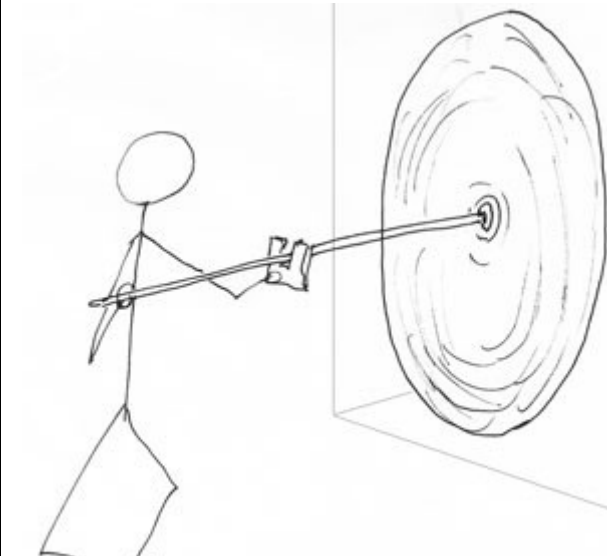
predetermine where the break is to occur. Glass can only be shaped and blown at high temperatures and when cooled it is hard and brittle.

The precise date and origin of man-made glass is unknown, but the very earliest glass in the form of decorative beads and inlay for metal and wooden objects date to between 3000 and 2500 BC in western Asia . The earliest written information on glassmaking was found on a Mesopotamian tablet of the 17th century BC in a recipe for glaze.

It is thought that the earliest use of glass in windows was in Roman Egypt using cast blocks of glass which might have been cemented into place in a similar way to “Dalle de Verre” (or slab glass) windows designed today.

In the first century BC the Romans discovered the revolutionary technique of blown glass and used small panes in windows. The discovery was made probably in Syrian workshops or in Jerusalem and likely began with the inflation of long thin glass tubes which evolved into the iron blow pipes used for the next 2000 years.

As manufactured flat glass sheet only became available in the early 1900s, how did they make flat glass from a blown bubble? There were two basic methods; crown glass and cylinder (or muff) glass.

14. Facts about Glass - Making Crown Glass	
Blowing Crown glass bubble. The bubble would be transferred to a pontil (or punty) rod – the pontil rod would have a blob of soft glass on the end which would be attached to the bubble. The blowpipe would then be cut off leaving a hole which would be opened up with a wooden stick ready to be spun.	
Spinning the bubble.in front of the furnace. The bubble is spun in front of the furnace to keep the glass soft. It's a bit like spinning a pizza base to make it thinner.	
The full disc. The disc is spun until it is thin at which point the glass can be allowed to harden. The pontil rod is then snapped off to leave the finished disc.	
Annealing the disc to relieve stress in the glass. The finished disc is annealed to allow it to cool slowly, relieving the stresses in the glass so it can be cut easily. The bulls eye at the centre where it was attached to the pontil rod is either returned to the crucible or used for ornamental purposes in plain windows or in geometrically patterned leaded glass	