

Glass cuts many ways

Glass, which is made from a very abundant raw material, common sand, is becoming an important material in modern life, says S.Ananthanarayanan

We are all familiar with the common use of glass, for making bottles and drinking vessels. But glass is now also used to give strength to structures, as an insulator and as a medium for carrying messages.

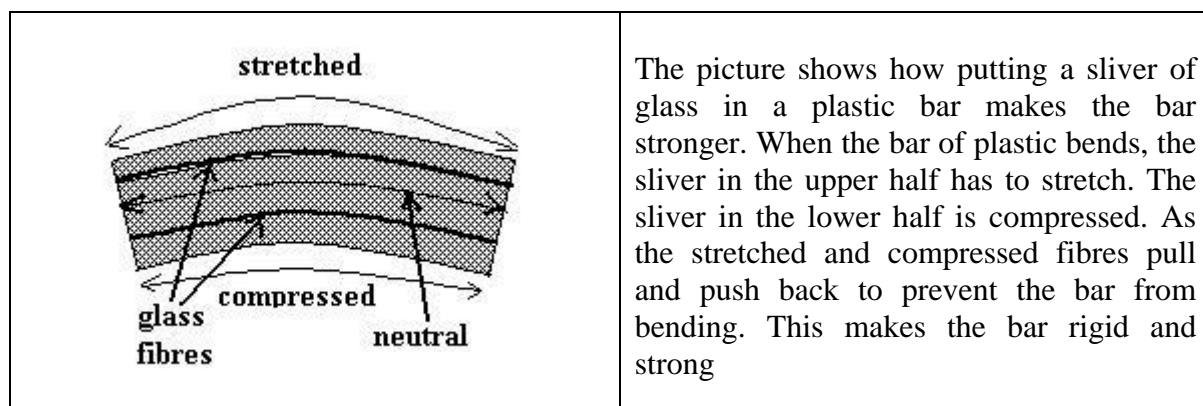
How it is made

Glass is simply made by melting ordinary sand and cooling it. In the process, the alignment of molecules in crystalline or regular patterns is destroyed and the material has a random structure like in the case of a liquid or even something like a gas. As in the case of liquids or gases, glass hence becomes transparent. Various additives give glass rigidity, strength and shades of colour. These have been refined and glass-making has grown into something of an art in the last few centuries.

Glass also has excellent resistance to corrosion and is insoluble in most liquids. This has made it an ideal container for wines and liquors and even corrosive chemicals, for use as retorts in chemical processes, etc.

Use as a reinforcement

Thin fibres of glass have excellent elasticity and strength, even more than carbon or steel fibres of comparable weight. Fine glass fibre is thus embedded in plastic to 'reinforce' the plastics, for building rigid structures.

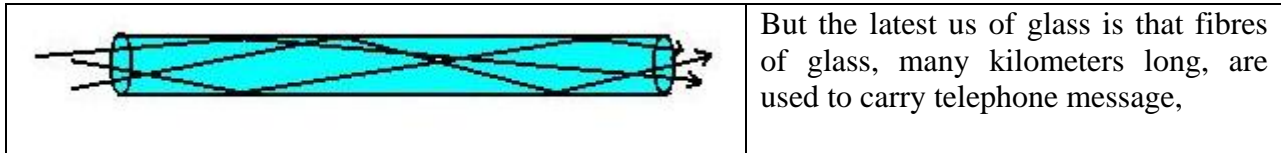


Glass fibre is now routinely used to make 'Fibre-glass Reinforced Plastic' (FRP) rooftops, marine structures like hulls for boats, crash helmets, acid tanks and so on.

As insulator

When glass is melted in a vessel with tiny holes and the vessel is spun around, the glass emerges from the vessel as fine threads. These fibres can be woven into mats, which can be folded around electric conductors, to act as very powerful insulators. Another property of very fine glass fibres, when packed tight into mats, is that the mats are excellent insulators of heat or sound. This is because the spaces between the thin fibres are of the same dimensions as the distances of movement of molecules of air. Air trapped in these tiny gaps are then not able to move freely to conduct heat, or to vibrate to convey sounds. One of the most important uses of glass fibre is to line boilers and steam pipes and save loss of heat Or to be laid along the walls of concert halls to improve the acoustics.

In Communications



information, data, practically without loss or distortion, over hundreds of kilometers. The sounds or information are converted onto a digital light signal and the light is let into one end of the glass fibre. The light beam keeps reflecting off the sides of the fibre, till it reaches the end, when it is picked up by a light sensing device. By changing the angle at which the light bounces off the sides, many signals can be passed at the same time.
