FIBERGLASS

Introduction

It is a common type of fiber-reinforced plastic using glass fiber.

- Fiberglass is a lightweight, extremely strong, and robust material.
- Fiberglass combines its light weight with an inherent strength to provide a weather resistant finish with a variety of surface textures.

The fibers may be randomly arranged, flattened into a sheet (called a chopped strand mat), or woven into a fabric.
The plastic matrix may be a thermoset polymer matrix—most often based on thermosetting polymers such as epoxy, polyester resin, or vinylester—or a thermoplastic.

BACKGROUND

Fiberglass really is made of glass, similar to windows or the drinking glasses in the kitchen. The glass is heated until it is molten, then it is forced through superfine holes, creating glass filaments that are very thin.

fiberglass itself may be manufactured from recycled glass

Originally, fiberglass was a glass wool with fibers entrapping a great deal of gas, making it useful as an insulator, especially at high temperatures.

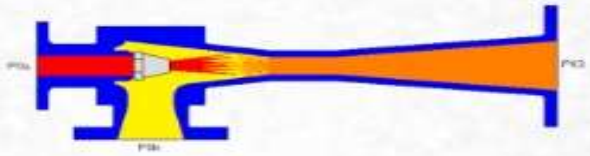
Source: http://chemsrv1.uwsp.edu/fire/FireCD/macrog/mpm/composit/fiber/fibeglas/history.htm

History

Ancient Egyptians and Phoenicians are among the many civilizations who produced small amounts of coarse glass fibers for decoration

1880 – Hermann Hammesfahr was awarded a patent for a fiberglass cloth interwoven with silk

1870 - John Player developed a method for mass-producing glass fibers with a steam jet process. It was used for insulation.



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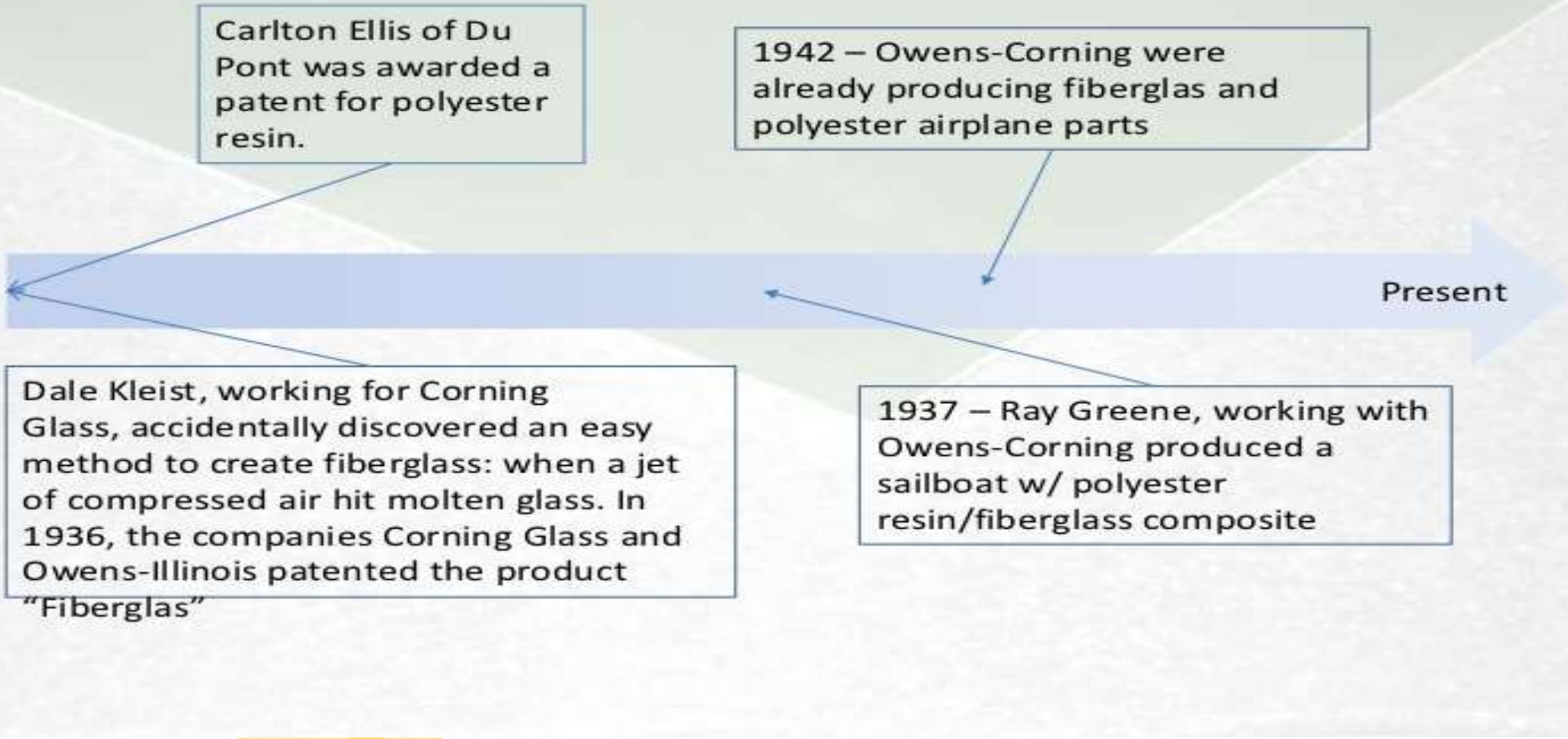


Applications

- Telecommunications
- Making storage tanks
- Septic tanks
- House building, door surrounds

Present Age Application

RAW MATERIAL

The basic raw materials for fiberglass products are a variety of natural minerals and manufactured chemicals. The *major ingredients* are

- **silica sand,**
- **limestone,** and
- **soda ash.**

❖ Silica sand is used as ***the glass former***, and

❖ soda ash and limestone help primarily to lower the melting temperature

Waste glass, also called ***cullet,*** is also used as a raw material.

The raw materials must be carefully weighed in exact quantities and thoroughly mixed together (called batching) before being melted into glass.

TYPES OF FIBER GLASS

The following classification is known:

1. A-glass: With regard to its composition, it is close to window glass

2. C-glass: This kind of glass shows better resistance to chemical impact.

3. E-glass: This kind of glass combines the characteristics of C-glass with very good insulation to electricity.

4. AE-glass: Alkali resistant glass.

CHEMICAL RESISTANCE- Fiberglass textile fabrics will not rot, mildew or deteriorate. They resist most acids with the exceptions of hydrofluoric acid and phosphoric acid.

DIMENSIONAL STABILITY- Fiberglass fabrics will not stretch or shrink. Nominal elongation break is 3-4 percent. The average linear thermal expansion coefficient of "E" glass is 5.4 by 10.6 cm/cm/°C.

GOOD THERMAL PROPERTIES- Fiberglass fabrics have a low coefficient of thermal expansion and relatively high thermal conductivity. Glass fabrics will dissipate heat more rapidly than asbestos or organic

HIGH TENSILE STRENGTH- Fiberglass yarn has a high strength-to-weight ratio. Fiberglass yarn is twice as strong as steel wire.

LOW MOISTURE ABSORPTION-Fiberglass yarn has extremely low moisture absorption.

ELECTRICAL INSULATION- High dielectrical strength and relatively low dielectrical constants make fiberglass fabrics outstanding for electrical insulation purposes.

- resistance to corrosive attacks;
- tight structure;
- superior shock and wear resistance;
- lightweight;
- simple assembling;
- damage and breakage resistance;
- aesthetical and attractive look;
- at temperatures below zero it doesn't become slippery or covered with ice
- hardly bendable material

GREEN AND SUSTAINABILITY

Fiberglass is a natural choice when you're seeking energy-efficient, green, sustainable solutions.

Due to its composition, fiberglass is known for its very low **embodied energy** — the total energy required to produce a product from the raw materials stage through delivery of fiberglass products

Typically fiberglass requires no added materials to reinforce it, reducing the bulk and weight of windows and doors, helping cut transportation costs in the process.

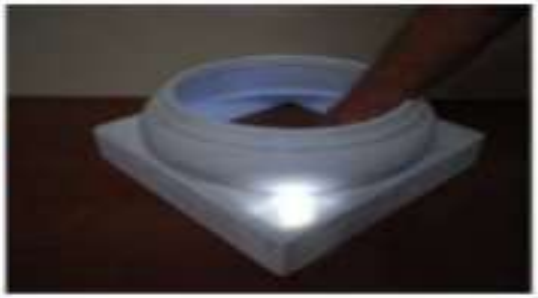
Sustainability starts with sand — an abundant natural resource
The main ingredient in fiberglass is glass. Since glass is made from sand — an abundant, natural, non-depleting resource — fiberglass is a highly-sustainable solution

Because of their **low coefficient of thermal expansion**, fiberglass windows and doors provide energy-efficient solutions that help seal out the elements - even in extreme hot and cold climate conditions.

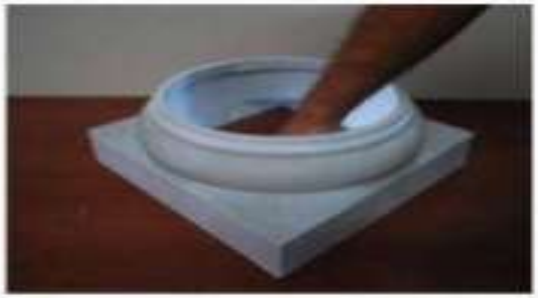
- **COST – 75RS/ SQ FEET**
- **COLODOES NOT AFFECT R THE COST**

Fiber Reinforced Polymers (FRP, Fiberglass)

FRP products generally produced as a thin rigid laminate shell formed by pouring a polyester or epoxy resin gel coat into a mold.



Non-Class A Fire Rate Column Base (Fiberglass)



Class A Fire Rated Column Base (Fiberglass)

Application : Its good molding ability and versatility to represent stone, wood, metal and terra cotta make it an alternative to ornate or carved building elements such as column capitals, bases, spandrel panels, belt courses, balustrades, window hoods or parapets. Its ability to reproduce bright colors is a great advantage.

Advantages:

- lightweight, long spans available with a separate structural frame
- high ratio of strength to weight
- good molding ability
- easily installed, can be cut, patched, sanded
- non-corrosive, rot-resistant

Disadvantages:

- ultraviolet sensitive unless surface is coated or pigments are in gel coat
- vapor impermeability may require ventilation detail

Fiberglass is unaffected by termites and its use as a replacement to wood virtually eliminates toxins from exterior painting and pesticides.

The ***disadvantages*** is that it needs to be re-gel coated about every five years and can result in airborne fibers which may be an issue to asthma sufferers.

APPLICATION

Structural Day lighting Panel Features

- Natural light transmission
- Lasting aesthetics

Fiberglass Roofing

- Cooling tower casing

- Reduced energy bills
- Maintenance free
- Range of profiles & colors

DESIGN AND ARCHITECTURE