ENGINEERING

It's All Done with Glass

From fire-rescue suits to window curtains, glass is in the limelight as one of industry's exciting materials. It scores high in fireproofness, insulation power and flexibility.

By LLOYD STOUFFER

➤ AT Wright-Patterson Air Force Base I watched a man in a white suit walk into a great pit of fire fed by 500 flaming gallons of gasoline, stroll about unconcernedly for two minutes, and emerge unscathed—the only human being ever to survive longer than a few seconds in a temperature of 2000 degrees Fahrenheit. He lived because his suit covered him from head to toe with glass—many layers of glass cloth and glass wool. The temperature inside the Air Force's fire-rescue suit (See SNL Nov. 26, 1949, p. 343) never exceeded 130 degrees.

Such dramatic proof of the usefulness of glass in its newer and more versatile forms fulfills its earlier promise: that glass would become one of industry's most exciting materials. In hundreds of new ways glass is working not only to save lives but to make our living better and more comfortable. Those qualities that make possible the Air Force rescue suit—fireproofness, tremendous insulation power, flexibility—also account for many of the new everyday applications.

Gossamer Glass for Insulation

Owens-Corning Fiberglas Corporation makes silky yarn of glass in continuous filaments so fine that a single ball of glass the size of a marble will produce a filament 97 miles long. These gossamer-fine glass fibers in wool-batt form provide the most effective heat-and-cold insulation known to man. Such insulation—several layers of fluffy glass wool, interspersed with glass cloth and reflective silver and aluminum foil—is increasing the efficiency and reducing the bulk of practically every refrigerator and range built today. Owens-Corning has a convincing demonstration of this. An unbaked pie is placed in the hot oven of a Fiberglas-insulated range, along with a carton of ice cream wrapped in a batt of the same insulation. At the same time a pot of hot coffee, similarly wrapped, is placed in a Fiberglas-insulated refrigerator. Half an hour later the pie is taken out baked, the ice cream comes out still frozen hard, and the coffee, removed from the refrigerator, is poured steaming into a cup.

In many stores throughout the country, glass cloth may be purchased in the form of sheer marquisette window curtains that will not catch fire, shrink, stretch, sag or wrinkle; they are unharmed by sun, mildew or rain and never need starching or ironing; they can be taken down, washed and rehung in about seven minutes and cost about the same as the finest cotton curtains.

Until a year ago glass curtains were stiff and boardy; the fabric tended to break. Now, a heat-and-chemical crimping process called Coronizing, gives the curtains vastly improved strength and a quality called "hand"; they are soft and springy and drape beautifully. Such curtains have a life of at least 20 machine washings (and require washing only one third as often as cotton).

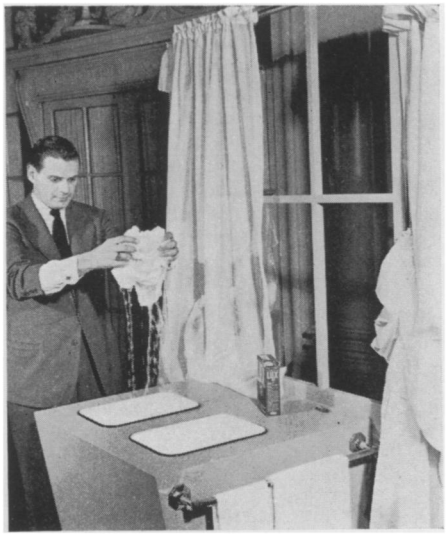
They reduce care to a fantastic minimum. I saw a demonstrator squirt a fountain pen on a pair of ruffled Fiberglas curtains, take them down and sweep the floor with them, dunk them briefly in a bowl of lukewarm water containing a pinch of detergent, blot them dry by rolling them in a bath towel and hang them again, clean and crisp—all in less than five minutes. In a year's test by the Columbia-Presbyterian Medical Center in New York the actual saving in maintenance was about 56% because hospital rooms were prepared for new occupants at record speed—the curtains were simply rinsed in the handbasin and rehung immediately.

A springy new insulating material called Aerocor is 99% air entrapped in a superfine glass wool lightly bonded into blanket form by a plastic resin. If you bought a storm coat or a good-quality child's snow suit last winter, it is probably interlined with the same material; you might mistake it for lamb's wool.

Glass Takes to Ball Field

Because glass in fabric form does not absorb water, most major-league baseball clubs now protect their fields with huge tarpaulins made of vinyl-coated, lightweight glass cloth instead of canvas. During a crucial New York Yankees-Cleveland Indians game last year a heavy shower came up in the second inning. A glass tarpaulin was quickly rolled out to cover the entire Cleveland infield. The shower passed, the tarpaulin was rolled up, and the game resumed. Six times, in all, that rainy day, the glass tarpaulin was used, with no noticeable increase in its weight. A canvas cover could have been rolled out only twice before becoming so waterlogged and heavy that it could not be rolled up again that day. Thus the glass tarpaulin, by making

ICE CREAM, OVEN-BAKED—The cherry pie is baked, but the ice cream is still hard after exposure to heat of 400 degrees Fahrenheit for 30 minutes in the oven of the household range because the ice cream was protected by a blanket of Fiberglas wool insulation. The range, like many other home appliances, is insulated with Fiberglas wool.



EFFORTLESS LAUNDRY — Sheer glass curtains involve a minimum of fuss and bother in their seven-minute suds-rinse-dry-and rehang routine. The truly glass curtains do not shrink or stretch, cannot burn, will not rot and require no ironing.

possible continued play and invalidating 75,000 rainchecks saved the Cleveland management close to $100,000.

Glass Conducts Electricity

At Corning Glass Works they showed me glass that conducts electricity. A 100-watt light bulb, touched to the top of a two-foot-high clear glass vase, lit and burned brightly, although there was no visible connection between the bulb and the wire attached to the foot of the vase. An incredibly thin and completely transparent film of tin oxide—only 16 one millionths of an inch thick—when applied to such glass is capable of conducting 6,000 watts per square foot. Invisibly coated on the bottom of a glass percolator soon to be marketed, it serves as a resistance heater producing a temperature of some 500 degrees Fahrenheit in a few seconds. Corning calls the new glass "E-C" for electrical-conducting.

The E-C percolator comes with a black plastic base, to be connected with ordinary house current. When the percolator is placed on the base, three metal spring buttons are depressed, contact is made, current flows through the glass and the coffee perks in less than a minute.

Libbey-Owens-Ford has a similar electrically conductive glass which it calls Electrapane. It can be thermostatically controlled and is already widely used as a self de-icing window for airplanes, locomotives and ships. So far the ordinary automotive electrical system does not provide a sufficiently high voltage but it is a distinct possibility for the higher-powered school buses, police cars and ambulances.

Another interesting development is photosensitive glass, containing chemicals which permanently record any picture when a negative is placed over the glass and exposed to ultraviolet light. Since these microscopic chemical particles are dispersed all through the glass, the picture is actually inside and a part of the glass. Color can be dark blue or red, or a blending of the two, and a sepia tone is now under development. Once recorded, nothing—short of breakage—will affect it.

Photosensitive Glass for Industry

There is nothing complicated about the process of making these pictures. A piece of clear glass is placed in a conventional photo-printing frame behind the negative and hung for 20 minutes in front of an ultraviolet lamp. After exposure, the glass is "developed" in sharp blue tones, by placing it for 40 minutes in an electric furnace at 1,000 degrees Fahrenheit. Longer exposure would produce a red picture.

Of particular interest are the industrial applications of the photographic process. It was discovered at Corning that a ⅛-inch sheet of photosensitive glass with a criss-cross pattern of opal white lines ingrained through its depth provides an ideal material for controlling the dispersion of light from incandescent and fluorescent fixtures. Fota-Lite glass gives an even, glareless light throughout the room—as well as direct light, channeled straight downward through the clear 1/16-inch squares, for close seeing.

The blue-green tint of the vast window areas in New York's new United Nations skyscraper represent Libbey-Owens-Ford's latest contribution to window glazing—a special glare-reducing, heat-absorbing plate glass. Two types of iron oxides—ferrous and ferric—are used in most glassmaking. Glass containing a high percentage of ferrous oxide absorbs light rays near the infrared (heat) end of the spectrum; glass with a heavy content of ferric oxide blocks light in the ultraviolet (glare) area. In the development of sun glasses and welding goggles it was found that a proper balance of the two oxides would achieve this double purpose without materially reducing beneficial light. Although the production difficulties were immense, this principle has now been carried over into the manufacture of plate glass, known as E-Z-Eye.

An E-Z-Eye car windshield appears no different from ordinary safety glass, except for the bluish-green tint—not unlike that of high-grade sunglasses. The tint is more noticeable outside than inside the car. Actual tests show that such windshields cut glare transmission 33% and eliminate about half the heat.

But of all the new fields for glass, the most prolific in exciting new consumer products is the combination of glass fibers, as reinforcement, with plastics—producing materials that are lighter than any low-cost metal, stronger than any high-tensile metal. Great strides have been made with this material since it first proved its possibilities in the Army's wartime bullet-resisting "glass" airplane and the Navy's bulletproof vest.

Glass Plus Plastic

The newest production process eliminates the expense of first weaving the glass fibers into cloth. Borrowing a method that has been used for years in the making of felt hats, loose, cut fibers are blown onto a screen formed in the approximate shape of the desired object and held there by suction. This "pre-form" is then placed in a metal mold and a gob of quick-setting, liquid polyester resin is poured on. The mold is then closed on the syrupy mass, which is formed to exact dimensions.

The resulting product, with the glass fibers running in all directions through it, has amazing strength—a quality which makes it very useful in many products, from safety helmets to suitcases. At Owens-Corning, three small trays were set bottoms up, on the floor—one of black metal, one white porcelain-enameled and one of the Fiberglas-plastic combination. Then from a four-foot height, a 12-pound shot was dropped on each in turn. The black metal tray was hopelessly dented. The porcelain tray was crushed and the coating cracked off. But when the shot hit the Fiberglas tray, it bounced back up like a rubber ball and did not leave a mark. A corrugated Fiberglas sheet barely 1/16 of an inch thick is strong enough to support a man's weight, yet can be sawed and nailed like wood.

In the last two years Fiberglas-plastic combinations have virtually taken over the fields of fishing rods and small boats—and last winter Fiberglas skis, so light and fast that they were not recommended for amateurs, were the talk of the skiing slopes. Glass fishing rods are said to have all the spring and casting action of fine bamboo without the disadvantages. A standard test is to bend the tip of a rod back five inches beyond the handle without breaking. If properly made, these glass rods are good for a lifetime of fishing. The Fiberglas boat has color molded in, cannot absorb water, will not rot, never needs painting or caulking, is virtually puncture-proof and weighs less than half as much as a comparable wooden craft.

Doctors are heartened by the discovery at the University of Virginia that a gown made from a fabric woven of lead-glass yarns will protect all the vulnerable parts of the body from the X-radiation which causes an incidence in radiologists of deadly leukemia eight times higher than normal. The same fabric is highly resistant to the beta radiation of atomic-fission products—a note of hope for all of us in this atomic age.

Science News Letter, June 17, 1950

MEDICINE

Conquest of Heart Ills

➤ PROGRESS is being made in the battle to conquer heart disease. Through scientific research we will find the cause of and means of preventing much heart disease.

This was the opinion of Dr. Cassius J. Van Slyke, director of the National Heart Institute of the Public Health Service, one of the country's top research scientists and medical administrators. He spoke on Adventures in Science over the Columbia Broadcasting System as the guest of Watson Davis, director of Science Service.

"Over the past 25 years," said Dr. Van Slyke, "there have been greater scientific advances in the understanding of heart disease than in all the years before."

Dr. Van Slyke explained that the National Heart Institute which was set up under a law of Congress, is working not only on the heart and circulatory system, but on interrelated organs and systems, hereditary and environmental factors, nutrition, physiology and the whole aging process.

Within the past few months, he said, nearly 500 research grants have been awarded, totaling nearly $5,500,000. And more than $6,000,000 have been awarded for construction of new laboratory facilities to 25 institutions in 16 states.

A new Clinical Center will be ready about July, 1952, Dr. Van Slyke reported, to be used by new research groups, the nuclei of which are being established now.

Science News Letter, June 17, 1950

AREONAUTICS

Escape Hole in Plane Can Be Cut by Explosion

➤ PASSENGER escape from burning, crashed airplanes is expected to be aided by a device developed in England that eases the job of cutting an escape hole through the walls of the plane. It utilizes a shaped-charge explosion.

As described in London by an aviation authority, a line-charge, looped into a rectangle and specially shaped to give a punch in the right direction, blows a hole in the side of the plane. The line charges are made in the form of a tube, the explosive in the center like the wire in an electric cable.

The shaped-charge can be embedded in a semicircular cover, the flat side being coated with an adhesive to give close contact. This gives the shaped-charge effect. When fired, the explosive concentrates its energy against the side of the structure, giving a cutting performance much superior to a similar round charge.

In use in a burning plane, the device is held against the side of the fuselage on the end of a long arm and fired from a distance. Passengers inside the plane would not be injured by the explosion unless they were leaning against the panel blasted out. The idea of this shaped line charge was developed for use in crash fires when it became evident that ordinary break-in tools are ineffective.

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ANTHROPOLOGY

Brain Pattern Clue To Human "Missing Link"

➤ NOBODY has discovered the remains of a human "missing link" yet, but when somebody does, it will be easily identified by the evidence of its brain pattern on the inside of its skull.

This is the conclusion of Dr. Cornelius J. Connolly, professor of physical anthropology at Catholic University in Washington, after the study of 538 brains from more than 50 species in the vast collection of the U. S. National Museum.

Dr. Connolly said that the skulls of the so-called ape men found in South Africa show that those creatures were definitely anthropoid rather than human.

The anthropologist, who has recently published a book based on his research, EXTERNAL MORPHOLOGY OF THE PRIMATE BRAIN, started with the brain of lemurs, lowest of the primate family and worked upward to human brains. He also studied the skulls of many prehistoric creatures which had on the insides markings left by the brain patterns.

There is a definite distinction between the brains of humans and of the most highly developed ape—the chimpanzee, he said. One of the distinctions is in the part of the brain which controls speech.

"The brain is the most important factor in distinguishing between prehistoric men and apes," he declared. "No skull has yet been found which shows an intermediate stage between the brain of the ape and that of man."

Some other anthropologists, however, would not agree with Dr. Connolly that the brain pattern is the most important factor. Some remains, although they show evidence of ape-like brains, have leg formations almost exactly like human beings, enough like them to permit the creatures to walk on their hind legs.

Science News Letter, June 17, 1950