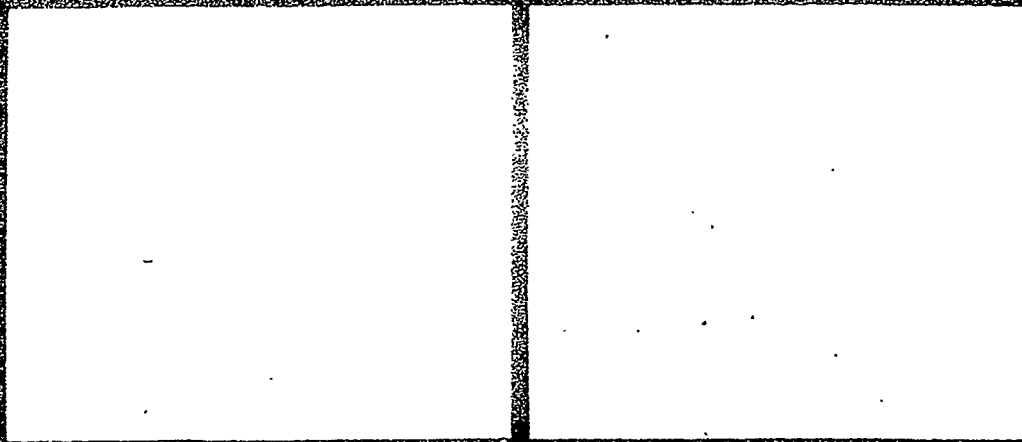




1—A group of blanks punched from phenolic resin board. When molded, they will form parts of exceptional strength. 2—Army mess kit knife has a handle molded from two matching blanks of phenolic resin board.

New uses for phenolic resin board

NEW wartime applications of phenolic resin molding board and blanks are calling attention to the potentialities of these products where impact resistance is a requirement. As far back as 1932 they were demonstrating their adaptability to an important number of industrial applications, and today when the major requirement in practically all types of phenolics is high impact strength, industry is rediscovering their unique properties.

Best known of the group is phenolic resin molding board, which is classed as a medium high impact material, with impact strength of .85-1.2 on A.S.T.M. Izod test. Its tensile, flexural and compressive strength is unusually high for a material with such outstanding impact resistance. It is produced by combining various types and quantities of resin and fibers on paper-making equipment. The resulting boards are then supplied in various size sheets or more generally in shapes cut to the approximate design of the finished part. Since these blanks, as they are called, are virtually preforms, they can be loaded directly into the mold.

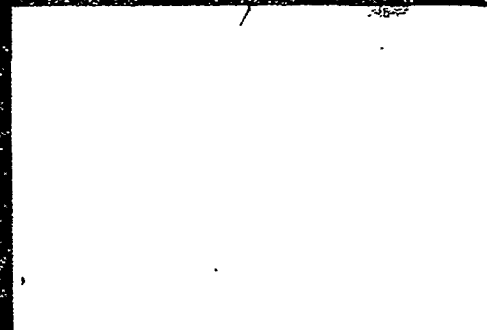
Most unusual characteristic for an impact-resistant plastic, however, is the low bulk factor of 1.5-1.0. This makes it possible to fabricate finished parts in molds designed for general-purpose phenolics. Since wartime service demands that existing product designs be adapted to materials tougher than those used in the past, it is often necessary to make the change immediately. Whereas fabric-filled impact-resistant materials would require deeper and stronger molds to accommodate greatly increased bulk factor and molding pressures, the use of molding boards or blanks requires no change in molds, and only minor modifications in technique.

Different types of board offer a variety of combinations of mechanical and electrical strength, surface appearance, flow and moisture resistance. By lowering the resin content of the

material, higher mechanical strength may be obtained, but this lowers flow, finish, and water-resistant characteristics proportionately. Either fast-curing or slow-curing types of resins can be used, thus still further increasing the diversity of relationship between properties.

Molding blanks or boards may be used alone in producing the finished product, or they may be employed in conjunction with standard types of phenolics to provide reinforcement at vital points. Frequently parts that are subjected to mechanical shock require color, surface electrical properties and other characteristics not obtainable with molding blanks alone.

3—Diced or macerated resin board is granular in structure, has high impact strength, low bulk factor. Surfaces of articles molded from it look like those of phenolic pieces, although pressures required are relatively low and temperatures of 290°-310° adequate



In such instances the outer material

Resin board parts—cams, for strength. Mold toughness when free-flowing granules as small as fully. While minimum flow, those of general

Newest and board family is strength of .35-though 3 to 4 times the general-purpose formed on both. Cut to pass U.S. the hoppers of general-purpose material water resistance standard types known. Its superior to that

Tensile strength new diced mold flexural strength after a standard 40-90 percent disk molded from gain of 1.9 percent 125 volts per mil $\times 10^3$ megohm properties, however dielectric strength subjecting character to molding.

An important low bulk board materials general-purpose fabric-filled impact mand extra deep and more adequate. Furthermore, the sary with fabric stronger construction. Molding pressure relatively low—temperatures of 290°

Diced resin board applications where fabrication are matters of sound large circuit break

4—First step phenolic resin to approximate are then damaged operation after preparation. 5— from flat slabs 7—Headband

In such instances the blanks may be used merely as a core for the outer material, a combination impossible without blanks.

Resin board is especially desirable where small molded parts—cams, for instance—must have high mechanical strength. Molding powders or preforms lack the desired toughness when fabricated into tiny sections. By using a free-flowing grade of resin board, however, impact-resistant pieces as small as $\frac{1}{4}$ in. square may be produced successfully. While it is true that maximum strength demands minimum flow, the mechanical properties obtained exceed those of general-purpose phenolics.

Newest and most important development in the resin-board family is a diced or macerated type with an impact strength of .38-.45 ft.-lb. energy to break by Izod test. Although 3 to 4 times more resistant to mechanical shock than the general-purpose woodflour-filled phenolics, it can be preformed on both single stroke and rotary tabletting machines. Cut to pass U. S. Standard 6 mesh screen, it will feed through the hoppers of automatic molding presses as readily as general-purpose materials. It provides all of the toughness, water resistance and other physical characteristics for which standard types of resin boards and blanks long have been known. Its surface appearance, when it is molded, is comparable to that obtained with regular phenolics.

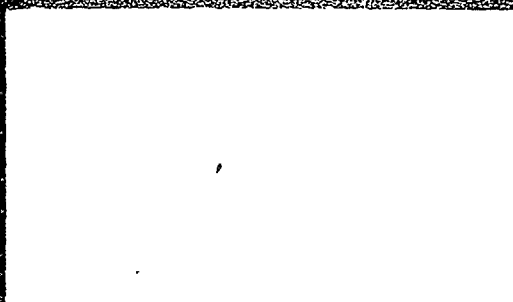
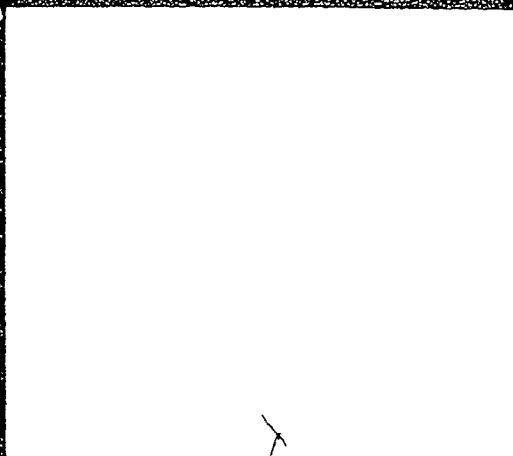
Tensile strength of standard molded test specimens of this new diced molding board ranges from 4500-5500 p.s.i. and flexural strength from 7100-8500 p.s.i. Water absorption after a standard 24-hr. A.S.T.M. test shows a gain of only .40-.90 percent. Even after 5 hr. in boiling water, a 2-in. disk molded from this macerated board revealed a maximum gain of 1.9 percent. Dielectric strength at 60 cycles is 110-125 volts per mil (step method), and volume resistivity is $2-3 \times 10^4$ megohm centimeters. To secure maximum electrical properties, however, the material must be preheated. Both dielectric strength and volume resistivity may be doubled by subjecting charges to 200° F. for 30 min. immediately prior to molding.

An important advantage of diced molding board is its relatively low bulk which, in common with that of other molding board materials, permits its use in molds made originally for general-purpose phenolic, an aid in saving time and cost. Fabric-filled impact-resistant plastics, on the other hand, demand extra deep molds to accommodate their greater bulk and more adequate heating of the platens for correct flow. Furthermore, the vastly increased molding pressures necessary with fabric-filled phenolics call for molds of considerably stronger construction than those for woodflour-filled materials. Molding pressures for diced board, on the other hand, are relatively low—ranging from 5000-5800 p.s.i. Molding temperatures of 290-310° F. are adequate.

Diced resin board is adaptable to a wide variety of applications where impact- and shock-resistance and high-speed fabrication are required, such as on the receivers and transmitters of sound power telephones and for the handles of large circuit breakers.

(Please turn to page 144)

4—First step in molding industrial goggle frame of phenolic resin board is to cut one edge of both strips to approximate contour of finished frame. 5—Strips are then dampened, coiled and dried—a preforming operation after which they are molded without further preparation. 6—Rings to hold lenses (below) are molded from flat stamped sections of the phenolic board. 7—Headband and lenses complete assembled goggles.



it is possible, even in the face of rising costs, to design and build a large capacity injection machine of approximately 24 ounce plastifying

SPE News, January, 1949

Weight

21,500 lbs.

Standard Equipment: Motor, timers, pyrometers, water-cooler, 2 nozzles 3/4" and 7/16", wrenches. Machine to be ready for operation except for wiring of motor, piping of water-cooler, addition of hydraulic oil, and mold.

Twenty-five

Injection
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January, 1949

PLASTICS IN PACKAGING DISCUSSED AT NEW YORK

By ARTHUR M. MERRILL

Thirty-four members and guests of the New York Section attended a regular dinner meeting on December 14, at the Hotel Sheraton. Speaker of the evening was Carl Cobblestick, packaging director of Egmont Arens Associates, who discussed "Plastics in Packaging."

Plastics will become more widely accepted as a packaging material, Mr. Cobblestick said. Manufacturers' resistance to plastic packages has been based on their higher unit cost, but such resistance is not justified in view of the greater sales appeal of the plastic package. Although higher unit costs prohibit use of plastics for every packaging application, the following factors justify consideration of plastics for any specific packaging problem: (1) possibility of increasing sales by converting a planned purchase item into an impulse purchase item; (2) building demand and brand loyalty by plastic containers having re-use value; (3) merchandising the line with matched-set containers which stimulate the purchaser to buy the whole line in order to complete the set; and (4) prestige and novelty of plastic packages where such qualities help sales. Mr. Cobblestick illustrated his talk with samples of plastic packages used to merchandise different types of products, giving case histories of increased sales following introduction of the plastic package. The speaker concluded by emphasizing that the plastic package is primarily a merchandising aid and only secondarily a container.

In the business session preceding the talk, section president Arthur Nufer, Bakelite Corp., announced the election of the following new directors: George Barron, Ideal Plastics Corp.; E. V. Walsh, Tech-Art Plastics Co.; and Bruce Wessinger, Wess Plastic Molds, Inc. Mr. Nufer also announced that the group will be the guests of the Newark Section at its next meeting on January 12, at the Newark Athletic Club. "Selecting the Right Plastic Materials" will be the subject of this meeting, and speakers will be Robert Burns, Bell Telephone Laboratories, and Emil Beckman, Army Signal Corps Laboratory, Ft. Monmouth. Table favors consisting of plastic puzzles with key chains were distributed through the courtesy of Mr. Wessinger.

1948 National Officers



R. B. Bishop, R. G. Dailey, J. H. DuBois, M. J. Petretti

SPE News, January, 1949

Twenty-seven

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