

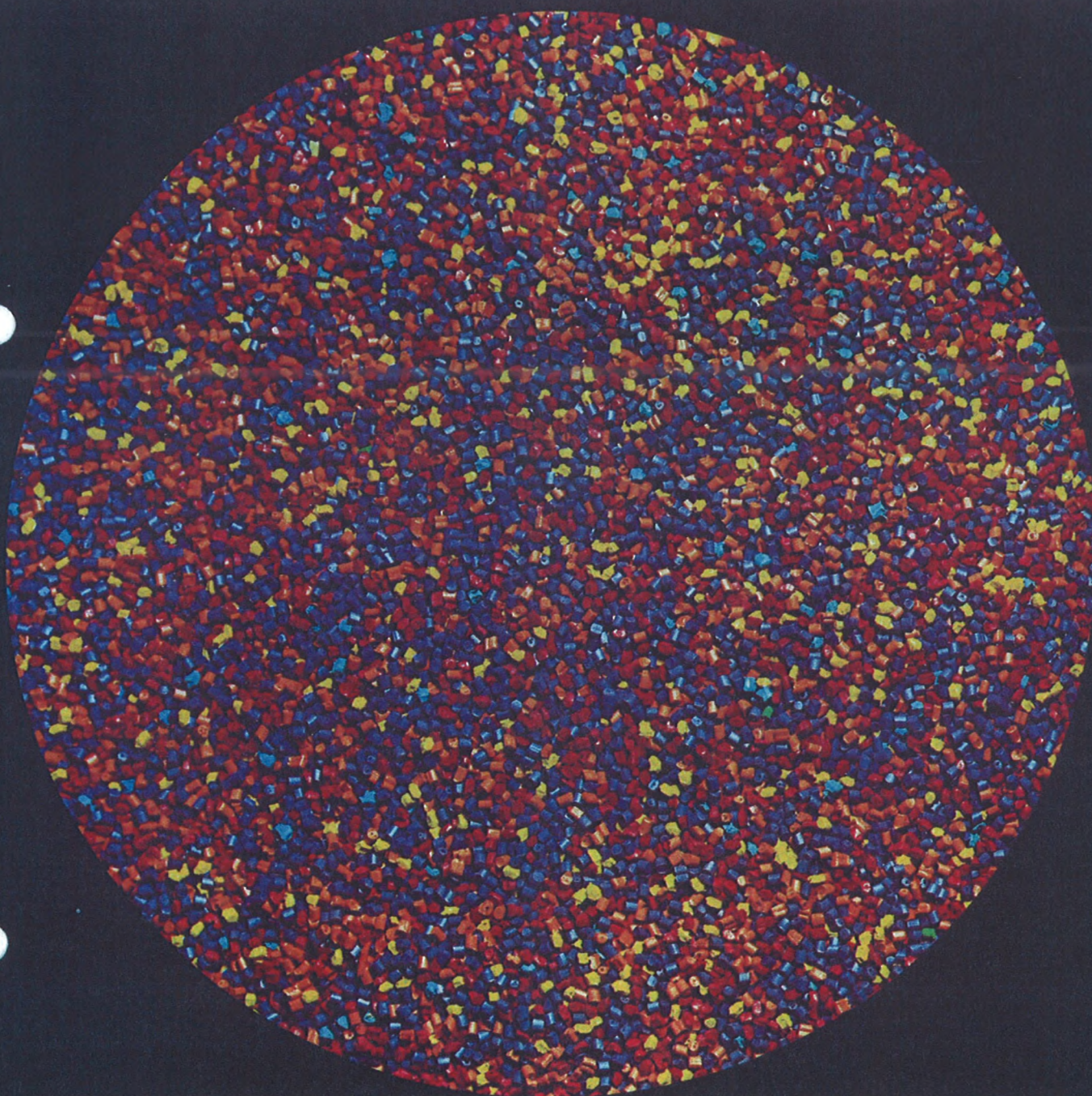


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BY GUM!

REICHOLD CHEMICALS, INC.



NEW PRODUCTS FROM RCI

A New Line Of Thermosetting Polyester Molding Compounds From RCI

A new line of thermosetting unsaturated polyester molding compounds has been introduced by the Company. Announced in the first issue of BY GUM! last year, the product group was discussed in some detail by RCI's Development Manager Robert Schmittberger at a technical conference of the Society of the Plastics Industry Reinforced Plastics/Composites Institute in a technical presentation which is condensed in this report.

Exceptional Arc & CTI Track Resistance

These dry, granular and pourable materials have exceptional arc and CTI track resistance, an increasingly important requirement of the electrical industry. Because they contain no monomers which volatilize, a major advantage is their almost indefinite shelf life under normal storage conditions.

In addition, these new RCI POLY-LITE® molding compounds exhibit good results under standard flammability tests and have good surface hardness and machinability. They contain no halogens or ammonia and, therefore, will not corrode inserts. Impact strengths approach one foot-pound/inch of notch izod. The products can be molded in cold powder compression, plunger and automatic injection machines with cure speeds half that of phenolics and ureas.

These compounds handle easily in contrast to bulk molding compounds (gunk) or sheet molding compounds.

Reasons for Using.

Manufacturers of molded plastic products can achieve a number of distinct benefits by using these thermosetting polyester molding compounds:

- **To upgrade electrical properties.**

Arc resistance. Polyesters inherently have very high arc resistance over 180 seconds by ASTM D-495. This is due

principally to their molecular structure.

- **Track resistance.**

Track resistance is sometimes confused with arc resistance. Arc resistance refers to the length of time it takes to arc across the surface of a plastic in the dry state in accordance with ASTM test D-495. The tracking test is relatively new by comparison and is a much more severe test. It is referred to as the Contaminant Tracking Index test or CTI test. It differs from the ASTM test in that it is run at a much higher current and the current is continuous rather than intermittent as in the ASTM test.

In addition, there is electrolyte present between the electrodes. The test measures the voltage at which tracking occurs after 50 drops of 0.1% ammonium chloride electrolyte are dropped between the electrodes. Most phenolics fail almost immediately although a few have been upgraded to withstand about 180 volts. However, they will not withstand higher voltages such as 220, 440 and higher. *Thermoplastic* polyesters melt and fail very quickly. The Contaminant Tracking Index test is becoming an increasingly important requirement for electrical parts.

Underwriters Laboratories are leaning toward this test more and more. A number of building codes around the country already have been changed to ensure that electrical switchgear and components are manufactured from products which pass this test at high voltages. The thermoset polyesters referred to in this discussion do not fail even up to 1000+ volts.

- **Dielectric fatigue is another electrical property in which polyesters are outstanding.**

Most products fail when exposed to dielectric voltages of 20,000 volts at room temperature. Those which will withstand such voltages normally fail when the parts being tested are sub-

jected to 180°F or higher. This is particularly true in automotive parts where higher and higher under-the-hood temperatures are being encountered. These polyesters withstand 20,000 volts at 250°F without failure in laboratory tests of two hours. Field service tests have already passed seven months without failure.

- **Indefinite Shelf Life.**

One of the main advantages to Poly-lite polyester molding compounds is their indefinite shelf life. Compounds which have been stored at ambient conditions for two years still have the same flow as at the time of manufacture. The reason for this is the lack of volatile monomers such as styrene or vinyl toluene.

Styrene is the most common ingredient for bulk molding compounds, sheet molding compounds and rope. However, it is well known that these types of compounds age very rapidly. Refrigerated storage helps, especially in warm climates, but the loss of volatiles is simply prolonged a little. If the molding compound has an odor, one can be certain that it is aging and constantly becoming stiffer. Some products on the market have been known to age to the point of being unmoldable in as short a time as one day.

- **To obtain higher production rates.**

The time required to cure a polyester free from blisters is much less than for a phenolic part or a urea part. This is due to the formation of less volatiles. Since the volatiles create the blisters, removal of them results in faster cure.

The order of magnitude of cure speed reduction is 30 to 50%. This in turn results in a 60 to 100% increase in productivity. For example, assume a four cavity mold with 1/8 inch wall thickness being molded from phenolic with a 40 second cycle. A polyester in the same mold, curing in 20 seconds, would result in an increase from 8,640 parts/day to

17,280 parts. Such reductions in cure time can result in the use of fewer molds for the same amount of production, thus saving the cost of a new mold, the unit price of the press and the labor per part involved. Production can be maintained even when damaged cavities are blanked off.

A half inch thick part can be cured in as little as 42 seconds with preheat in compression molding. Plunger molded cure speeds are generally faster than compression. Injection molding gives the fastest overall cycles.

- **Freedom from halogens, ammonia and insert corrosion.**

When two-step phenolics are molded, ammonia gas is liberated during the curing reaction due to decomposition of hexamethylene-tetramine. The latter provides the methylene linkages necessary to form a three dimensional polymer. If a part containing inserts will be

used in an enclosed environment or exposed to heat, it is common for inserts, especially copper or brass, to corrode and lead to eventual short circuit or malfunction. This can be prevented by using other type polymers which do not liberate ammonia.

Similarly, some alkyd or polyester compounds, both thermosetting and thermoplastic, contain halogens to obtain improved results on the standard flammability tests. Those halogens also lead to insert corrosion. RCI Polylite polyester molding compounds are halogen-free.

- **To take advantage of fully automated methods to reduce costs.**

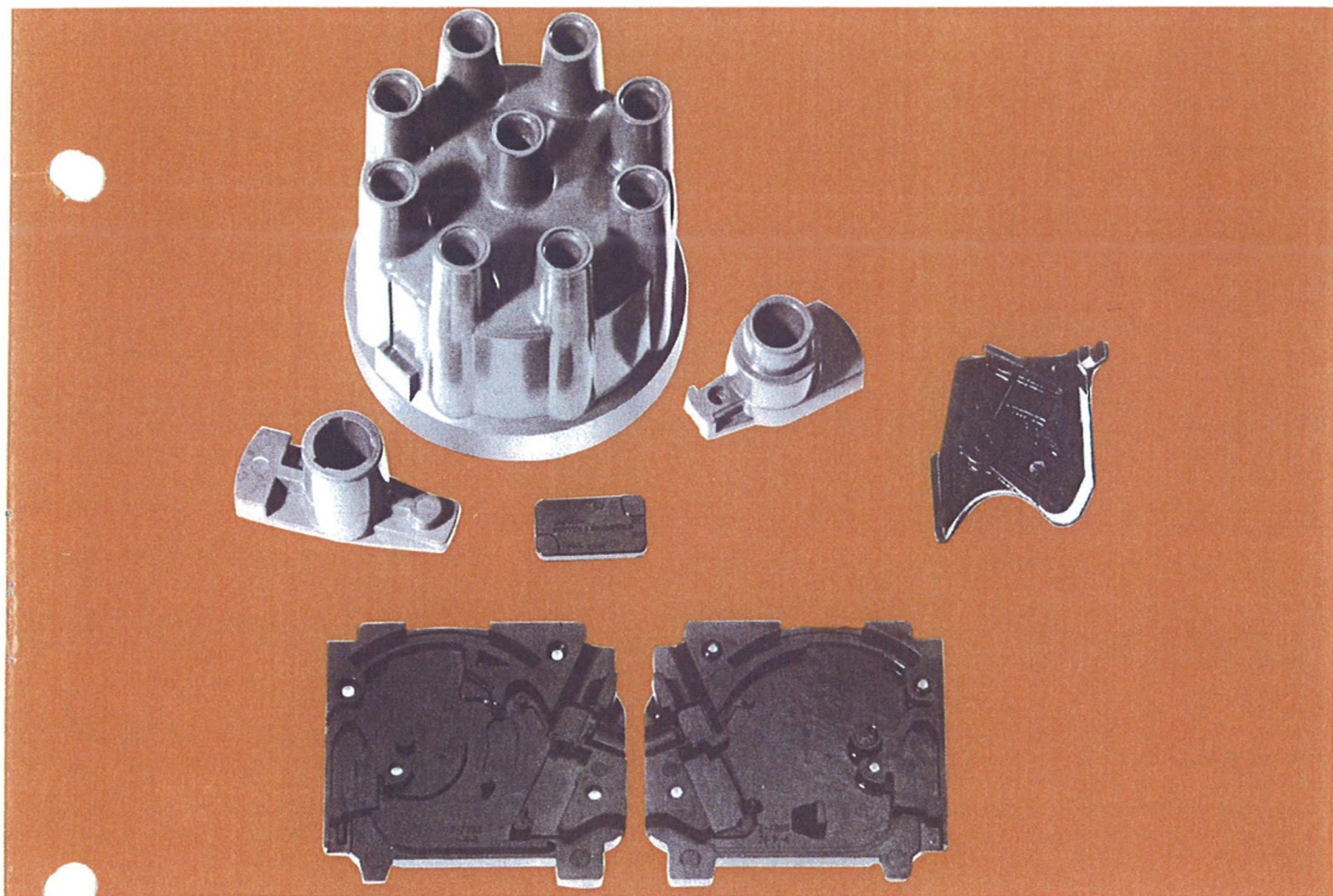
This would be true for any type of thermoset material which can be handled in an automatic press. Automation of BMC and SMC is much more difficult without expensive additional equipment.

- **To obtain parts with greater surface hardness for wear or scratch resistance.** The Barcol hardness of polyesters is approximately double most phenolics, a value of 65-76 being typical.

- **Flammability.** This is one of the most common words today and a great deal of consideration is being given to it throughout the country. Some of the compounds referred to here have been tested according to U.L. 94 and have achieved a rating of 94 V-O. Some compounds achieved this test rating with thicknesses as low as 1/32 inch.

- **Most of these polyesters have excellent machinability,** even those which are mineral or glass filled and which have high specific gravities. This is due to the methods used in formulation.

Inquiries on these new RCI Polylite polyester molding compounds are welcomed by the Company.



RCI's thermosetting polyester molding compounds are used in these types of products which require adaptability to fully automated production methods, surface hardness and excellent machinability.