WHY IS MICRO-MIX SOMETHING SPECIAL?

Hollow spherical particles have been available on the market as fillers for plastics for nearly a decade. Most of these fillers consist of graded spheres.

Spheres which are all the same size cannot pack very tightly, and the space between them can mount to 50% of the actual volume occupied. As a consequence, you cannot load the plastic up with more than 30 or 40% of these spheres: they will wedge together and refuse to flow. Irregular spheres of varied size range have the advantage of "packing" more tightly, so they can occupy 60 to 70% of the available volume before they begin wedging together. Thus, you can load the plastic resin with, say, 40 or 50% by volume of such spheres, and still have easy flow. The presence of these irregular hollow spheres will sustain the compressive strength of a plastic, but will greatly reduce its tensile strength. This is especially important if the polymer is to be used in flexion. The hollow spheres alone will not retard fire.

MICRO-MIX is a blend of both hollow and solid filler materials, graded into a range of sizes and distributed among 4 different shapes. The particular blend (which is custom-prepared for each unique application) can be matched 'so as to achieve a packing factor of as high as 88%. That is, the filler will occupy 88% of the volume available. You could load -such a filler into a plastic resin to the extent of 65% by volume, and still pour the resin freely. No other filler can do this. In addition to hollow spheres (A), the MICRO-MIX contains rod-shaped crystals, which fit into the narrowest interstices between spheres (B); it also contains flakes and chips of hard, tough mineral (C) that greatly increase the tensile properties of the resin matrix; finally, MICRO-MIX also carries a selection of pyramids or cubes, called "blocky irregulars" (D) which wedge into loose corners while the plastic is setting up, and build a filler which contributes to high modulus and rigidity of the product. Some or all of these ingredients are chosen for their fire-retardant properties, if such a characteristic is required in the product, and MICRO-MIX blends can thereby be adapted to an unusually wide range of applications.

Unlike common fillers -- including hollow spheres and the like -- the various grades of MICRO-MIX are Engineered Reinforcing Fillers which do much more than simply occupy space. They occupy more space than other fillers, and still permit plastic flow. They improve tensile and modulus characteristics of plastics; they impart fire resistance if needed, and enhance the usefulness of a plastic product while simultaneously reducing cost!

A comparison of MICRO-MIX with other filler materials on the basis of cost alone is not a meaningful comparison.

Cordial greetings from our Technical Director:

The sample attached is a new lightweight filler/extender for use with liquid resins, including polyesters, epoxies, acrylics, urethanes, silicones, and plastisols. It has a density of only 0.18 gm/cm^3, and weighs only 1/7 as much as an equal volume of resin.

This new invention, called MICRO-MIX, is a hollow, granular mineral employed as a resin extender for the manufacture of plastic and rubber articles, paints, adhesives and patching compounds. MICRO-MIX will:

- reduce your cost of production,
- increase product strength
- improve product surface finish,
- reduce product weight
- minimize shrinkage defects,
- reduce resin consumption by 40%°

MICRO-MIX does not require any changes or alterations in your present processing methods for liquid resins. It works with simple open pour molding, split-mold casting, centrifugal molding, compression molding, spray-up application, rotational molding, dip molding, foam molding processes, filament winding

and paste patching processes. MICRO-MIX enables you to use faster cure cycles, so you can produce more plastic products per hour.

MICRO-MIX is a fine, granular inorganic material employed as a reinforcing filler in plastics molding with liquid resins. It can replace 50% or more of the plastic resin, and results in a tougher, better-looking, longer-lasting product of much lower weight (at much lower cost!). MICRO-MIX grade MM-100 is a particulate mixture of various shapes with an equivalent particle diameter of 0.060 mm and with a very large specific volume: its true density is only 0.18 gm/cm^3 with a bulk density (dry) of only 8 lb per cubic foot. MICRO-MIX grade MM-140 has a density of 2.48 gm/cm^3. These two grades can be blended in any proportion to obtain a filler/extender for liquid plastic resins with any density desired.

Applications of MICRO-MIX

A broad range of product applications for MICRO-MIX includes:

Industrial Pallets	Barges	Pump Bodies	Artificial Wood Products
Machinery Housings	Tanks	Battery Boxes	Insulated Building Walls
Electric Switches	Bathtubs	Lamp Bases	Marine Vessels to ,24 meters
Manhole Covers	Vanities	Drainage Pipe	Seating for Chairs and Benches
Swimming Pools	Explosives	Toilet Seats	Bobbin Ends for Textiles, Paper
Sports Helmets	Gears	Kitchenware	Parts for Trucks, Buses, Autos
Bearing Supports	Handwheels	Washstands	High Tension Elec'l Insulators
Feed Troughs	Urinals	Cheese Crocks	Handles for Tools, Machinery
Texturized Paint	Toys	Concrete Forms	Building Blocks, Bricks and Tiles
Table Tops	Statues	Boot Soles	Dock Poles and Pilings

Advantages of MICRO-MIX

MICRO-MIX is a reinforcing extender for any liquid resin or compound, since it consists of tiny rods and flakes, as well as hollow bubbles and wedges. When added to the resin in amounts up to 50 or 60% by volume, it affects the flow only slightly, so you can continue to pour, cast, spray, flow-coat, squeeze or inject/extrude at low pressure, the same as always. When the resin hardens, MICRO-MIX increases its hardness and rigidity, its toughness and strength, much the same as chopped fiberglass. Furthermore, you can enhance properties of your plastic even more, by adding chopped fiberglass/ vegetable fibers (jute) to the resin extended with MICRO-MIX.

MICRO-MIX reduces product shrinkage during the cure, providing greater dimensional stability, and reducing the amount of heat generated in setting up. It presents no health hazard for the operator, reduces the amount of labor needed for a given amount of production, reduces product weight and cost by substituting for the more expensive resin.

MICRO-MIX is inorganic, impermeable to moisture, resistant to fire and chemical It can be stored for years without deterioration in properties.

Products made with MICRO-MIX can be nailed like wood, without cracking; they will accept screws, studs, staples, tacks and other fasteners and hold them as firmly as oak wood. Plastics filled with MICRO-MIX resist weathering and scratches.

MICRO-MIX works well together with other fillers, or it can substitute for them in many applications. It has replaced calcium carbonate, crushed silica, kaolin clay, aluminum silicate, solid glass beads, talc, alumina trihydrate and other inorganic mineral fillers, to reduce cost and weight of plastic products without sacrificing their durability or fire resistance.

We recommend using MICRO-MIX for applications where pressures do not exceed 5,' lb/in^2. (3.5 kg/mm^2), preferably at working pressures not over 2,000 lb/in.^{2}. High pressures damage the lightweight, hollow microspheres and reduce effectiveness'.

MIXING AND BLENDING OF MicroMix- MM100

Introduction

This technical note presents a few procedures and important points to keep in mind for mixing and blending of MM-100 filler.

The chief advantage of MICRO-MIX is its light weight and low density. This is because hollow microspheres constitute a large part of its volume. When mixing MM-100 into plastic resins or rubber compounds, you must blend in the filler very gently, to avoid damaging these spheres. This is especially important whenever you run experiments with MM-100, to determine how much filler can be used with success in your resins and compounds.

General Procedures for Additions

1. For thermosetting resins composed of two or more liquid resins, adjust the initial viscosity to 300 centipoises or less (down to 50 centipoises). Use a lower viscosity for spray-up applications, higher viscosity for casting/rotational molding, but not more than 300 cp. Control temperature carefully to a constant level, so it does not rise during mixing.
2. Introduce your heavy fillers first, adding promoters (accelerators), pigments and other essential additives which can be rapidly blended using a high-intensity mixer. Be sure that temperature does not rise during mixing.
3. For thermoplastic resins where filler is added at elevated temperature, use the highest temperature practical which will give a low viscosity -if possible, as low as 300 cp. Add pigments and heavy fillers while blending at moderate speed (for example, 45-60 rpm in a Banbury mixer).
4. Reduce the mixing speed, or transfer the batch to a slow paddle-type mixer and blend in MM-100 at a speed of 6 to 12 revolutions per minute. Keep the speed low, so temperature does not rise. Do not crush or abrade the MICRO-MIX. When blended, you may wish to apply a vacuum, removing excessive air, which may have become entrapped in the viscous mix. Mix only long enough to insure complete blending. Do not over-mix.
5. If your resin calls for a catalyst, add it now. Aim for a short gel time and use up all of the batch of resin before it sets up. Aim for 6 to 20 minutes set-up time for pouring resin into open molds. Use a longer setup time for spraying. Use longer times for very large batches.
6. If you must adjust viscosity or add other ingredients, do it now. Allow enough set-up time to insure proper addition and blending. Always add chopped fiberglass after catalyzing. The same is true for jute and other vegetable fibers. Adjust low viscosity by adding a little silica gel or fumed silica. If viscosity is too high, adjust the next batch by starting with a lower viscosity or adding plasticizer.

Experimental Development with MICRO-MIX

1. When you work with MM-100, think in terms of VOLUME, not in terms of weight!
2. If you have never used any filler with your resin,. run your first experiments by adding only 5 or 10% (by VOLUME) of MM-100. If you have always used another filler with your resin, replace this filler a little bit at a time, using MM-100, by adding only 5 or 10% (by volume).
3. Do not run your experiments by mixing in large volumes of MM-100. This will almost always lead to failure, since you may have to make some changes in your usual mode of processing.
4. When you have made test samples (or sample products) using only 5 or 10% MM-100 with your particular resin, test your samples (or products) carefully. Is the sample measurably lighter? Did you actually use less resin? Has the color changed? Are test samples stronger? Are dimensions

okay? Was it difficult to mix in the filler? (Maybe you need another type of mixer, or maybe you need to pre-blend MM-100 with your other filler materials). Did the batch temperature rise excessively? (Perhaps your resin mix should be less viscous -- add plasticizer or lower batch temperature).

5. Once you know how MM-100 additions affect your processing and properties,• add the MICRO-MIX filler in progressively larger amounts -- always a little at a time. Try 15% MM-100, then 20%, and so on, until you can successfully blend in 30% (by volume) or more of MM-100. Keep a test record to show what is happening as you add more and more MICRO-MIX. At some percentage (between 60% and 90% MM-100 addition) you will begin to note a decrease in properties . . perhaps the product is too light, or too fragile, or the resin is too viscous for easy flow. Whatever the change may be, this indicates that you should be using a little less MICRO-MIX in production, in order to obtain optimum properties for your product.

When used properly, MM-100 works especially well to replace fillers based on silicates (crushed silica, aluminum silicate, magnesia, kaolin clay, solid glass beads, talc, etc.). It also works well for replacing $CaCO_3$ and other low-cost fillers, especially in the manufacture of PVC pipe. MICRO-MIX 100 is ideal for use with chopped fiberglass, roving or matting. It can also be used with such inorganic fillers as gypsum, asbestos, titanium dioxide; and it can even substitute for carbon black in certain rubber applications.

By following the above procedures, you can take advantage of MM-100 to replace the maximum volume of costly resin and to achieve the greatest possible savings in cost of manufacturing your product.

A TECHNOLOGY & PRODUCT From PATENTECH CORP.

Micro-Mix is a filler material for plastics, rubber, adhesives, paints and coatings. It is used to extend and reinforce the resin or matrix resulting in products which are stronger, tougher and fire-resistant at much lower cost.

Micro-Mix is a mixture of fine-grained, inorganic powders whose shapes, sizes and materials have been carefully blended to achieve maximum packing efficiency without increasing the resin viscosity beyond working limits. The components of MicroMix include spheres, rods, flakes and prisms of compounds with the properties of glass or ceramic.

The flakes and prisms act to keep the rods and microspheres in-suspension, so the resin can flow freely at filler loadings as high as 67%.

APPLICATIONS

MICRO-MIX makes an ideal filler and reinforcement for thermosetting polyester resins, nylon, vinyl eaters and plastisols, epoxy resins, phenolic resins, urethanes (both rigid and flexible) as well as latexes and hydrosols, synthetic rubber and similar compounds (silicones, for example). It can also be used to extend acrylics and lowviscosity thermoplastics, but is not suitable for viscous polymers like polyethylene or polypropylene, nor is it suited' to thin-film applications.

MICRO-MIX can be used in conjunction with other filler materials to reduce the weight of bulk molded products, to impart fire resistance, to achieve higher filler loadings and conserve costly resin. It is compatible with all pigments (organic as well as inorganic), and it blocks out ultraviolet light. As an extender for paint, MICRO-MIX protects the coated surface from sunlight.

Resins containing MICRO-MIX can be employed in any process where working pressures do not exceed 1,200 lb/in.^{2} Thus, in addition to casting, spray-up, centrifugal/rotational molding and other non-pressure processes, MICRO-MIX can also be used for such diverse procedures as compression molding, filament winding, low-pressure calendaring and some kinds of injection molding.

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MICRO-MIX SAVES WEIGHT WHILE IMPROVING PROPERTIES

Additions of Micro-Mix 100 to plastic resins, such as Melamine, result in dramatic weight-savings. A commercial product requires 100 cubic centimeters of Melamine without fillers, and must resist relatively high temperatures.

Example: An addition of 40% of MM-100 by volume reduces part weight from 148 grams to less than 100 grams -- so the product now floats! Other advantages include:

1. Reduces shipping costs by 1/3
2. Tensile strength improves from 5,000 to 10,000 lb/in^2
3. Hardness and impact resistance are also improved
4. Addition of MM-100 increases heat deflection temperature at 264 psi from below 300°F to nearly 500°F
5. Less shrinkage and distortion in molding
6. Electrical resistivity of the product is improved

For compression molding, Melamine will accept a filler loading of 65% MM-100 without significant changes in these properties.

HOW DOES MICRO-MIX ENHANCE MOLDABILITY?

As a rule, when you add filler to a liquid resin, its viscosity increases -- until the mixture becomes so stiff it cannot pour into a mold or fill out all the detail. Fillers like calcium carbonate (chalk), magnesium hydroxide (magnesia), alumina trihydrate, aluminum silicate (mica), kaolin, asbestos and talc cause liquid resins to increase their viscosity very rapidly as filler is added. At a filler loading of 30 or 40% by volume, most resins become very thick.

Certain filler materials, like fine sand, glass spheres and rods (fibers) have less porous surfaces than kaolin, talc and chalk. They can replace 30 or 40% of the resin by volume without causing an excessive increase in viscosity. These materials, however, introduce new problems: glass fibers tend to mat up, and their sharp edges protrude from the surface of a plastic product, unless you roll them down into the plastic. Silica and glass spheres begin to obstruct resin flow at filler loading of 45 or 50% by volume, and these materials have a high density: they make the product heavy. Hollow glass spheres have fewer limitations, but they are costly and not always available on the market.

When MICRO-MIX filler is added to a resin, it has very little effect on viscosity until filler loading has reached the range of 50 or 60%. Most resins can still be poured easily -- and flow very well -at filler loadings as high as 65-70% MICRO-MIX by volume. This represents a considerable saving of resin, and means much lower cost for the producer of plastic products. Furthermore, the weight of filler can be altered to produce a very light or a very heavy product, as desired.

FOUR KINDS OF FILLER IN MICRO-MIX

Filler particles may be spherical, rod-shaped, flake or irregular (pyramids, cubes and other shapes). Each plays a role in boosting the properties of a plastic product. When combined in the right proportions, and used at high filler loadings, nearly all properties of a resin can be enhanced by the addition of MICRO MIX filler.

A. Fibers (or rods) add tensile strength to plastic. Long rods (with a high length-to-diameter ratio) add the most strength. Glass fibers are very strong, and can multiply the tensile and flexural strength of plastic as much as ten or twenty times. Fillers like wood flour or calcium carbonate cannot do this. Fibers, when used alone, are usually chopped up and sprayed onto a mold along with the plastic. For this reason, you cannot add much more than 20% (by volume) of glass or jute fiber in plastic. Also, it takes a lot of hand labor to roll out the protruding fibers to produce a smooth surface.

B. Flakes lend impact strength and stiffness to a plastic product. Glass flakes are not only the strongest, but they' also add fire-resistance. When flakes are used alone, they tend to stratify or laminate, and this introduces "planes of weakness" into the product. Also, the flake edges are sharp, and too many flakes can lead to cracking of the plastic under flexural stress. Consequently, flakes are rarely added in amounts over 20% by volume.

C. Spheres -- especially hollow glass microspheres -- introduce many valuable properties to the plastic product: great compression strength, good flow properties in open cast molding or in compression molding. The spheres roll over one another, like ball bearings. And, beat of all, they replace large volumes of costly resin with a low-density substance. You can usually add as much as 40% by volume of glass spheres to a resin before the spheres begin "nesting" and clumping up together. When this happens, it obstructs the easy flow of resin, and results in inhomogeneous distribution of filler.

D. The prisms and cubes act like tiny wedges. They fill in most voids between spheres, and displace even more of the plastic resin. So long as the resin has a low viscosity and flows easily, the "irregulars" have little effect. However, once the filled resin has been vibrated or pressed into place, the prisms and cubes settle firmly into their niches, and wedge all the other filler components into a rigid matrix. The irregular particles make a plastic product hard and tough.

MICRO-MIX uses all four of these filler materials <u>together</u> in carefully blended ratios; thus, it can offer many benefits over other filler materials.

First of all, the presence of rods and flakes helps keep all of the hollow microspheres carefully separated, by maintaining a film of resin between each filler particle. This way, the spheres and rods cannot clump up, even when you use over 60% filler. Actually, MICRO-MIX filler has been used to occupy as much as 88% of the available volume (with only 12% resin).

This example shows that you can use MICRO-MIX to achieve much higher filler loadings than any other filler, while retaining all of the advantages of easy molding.

Finally, when the plastic (or rubber, or coating or adhesive) has set up, all of the filler particles are locked into a homogeneous, tough and resilient mass, which will not warp (even if the plastic is over-cured) or crack (even when you drive nails or screws into it) or shrink (because glass does not shrink) or stick to the mold (because plastic filled with MICRO-MIX undergoes a minimal change in dimension upon setting).

Thus, MICRO-MIX enables manufacturers to create plastic products which are light, strong, tough, durable, easy to work, and low-cost -- all at the same time!

SOME CHARACTERISTICS OF INORGANIC FILLERS

TYPE OF FILLER	SIZE, MICRONS Min.	SIZE, MICRONS Max.	PARTICLE SHAPES	ABSORPTION INDEX (OIL)	COLOR	pH RANGE	MAXIMUM FILLER LOADING VOLUME PER CENT FOR: Casting	MAXIMUM FILLER LOADING VOLUME PER CENT FOR: Troweling
MICRO-MIX 100-140	7	70	multiple	0.25	white	7.0	67	88
HOLLOW GLASS SPHERES	5	130	spheres	v. low	white	7.0	30	60
CARBON BLACK	0.05		amorphou	13 - 30	black	-	60	70
CALCIUM CARBONATE	0.2	12	crystals	30	white	-	35	45
CALCIUM METASILICATE	3	12	acicular	low	white	-	-	-
CALCIUM SULFATE	2	7	crystals	-	white	-	-	-
ALUMINUM POWDER	-	-	flakes	low	silver	-	60	80
ALUMINA TRIHYDRATE	4	7.5	crystals	30.	white	-	40	55
ALUMINUM SILICATE (MICA)	0.5/2	10/300	flakes	41.5	silver	6.8-7.2	50	70
KAOLIN	0.2	4	flakes	25 - 65	white	4.0-7.5	30	40
GLASS BEADS	-	10	spheres	v. low	clear	-	30	60
GLASS FIBERS	3 x	300	fibers	low	white	-	25	-
ASBESTOS	3 x	275	fibers	high	gray	-	-	70
SILICA (QUARTZ SAND)	0.2	7	prisms	2 - 5	white	7.0	30	75
MAGNESIUM OXIDE	1.5	30	crystal	v.high	white	-	-	-
MAGNESIUM SILICATE (TALC)	2	38	flakes	v.high	white		30	40
SODIUM BORATE	-	-	crystals	-	white	5.2	-	-
MAGNESIUM SULFATE	-	-	crystals	-	white	-	-	-
TITANIUM DIOXIDE	0.2	0.4	prisms	-	white	-	-	-
BARIUM SULFATE	-	-	crystals	-	white	-	-	-

<u>Note:</u> Oil absorption index = grams of oil absorbed per 100 gm of filler. In general, higher filler loadings can be used when the oil absorption index is low.

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CHARACTERISTICS OF SOME COMMON INORGANIC FILLERS

Calcium Carbonate: low price, non-toxic, relatively strong, extrudes well, has relatively high oil (resin) absorption, is relatively heavy, absorbs water, somewhat conductive, maximum loading is limited to 30 - 40% by volume.

Alumina Trihydrate: flame-retardant, smoke-suppressant, but relatively costly.

Kaolin: good chemical resistance and electrical properties, relatively high oil (resin) absorption, very fine particle size (this limits the maximum loading), relatively heavy.

Mica: imparts great strength, good electrical and sound-absorbing properties, good castability even at high filler loadings, relatively heavy and costly.

Talc: improves impact strength, lowers tensile and compressive strength, good electrical properties, improves resistance to heat shock, very high oil (resin) absorption, very soft and heavy.

Carbon: good electrical conductivity, black color, very fine particle size with moderate oil (resin) absorption.

Glass Spheres (Solid): distribute stress throughout a molded structure, improve compressive strength and hardness, minimize part shrinkage, relatively costly.

Glass Spheres (Hollow): reduces weight of parts, improves impact resistance, arrests cracks, holds fasteners, improves thermal and acoustical insulation, limited crush resistance (1200 to 5000 psi), relatively costly, filler loading is limited for cast/spray-up applications.

MICRO-MIX: combines the most desirable properties of all the above fillers, while minimizing or eliminating the undesirable ones.

MICRO-MIX COMPARED WITH OTHER FILLERS

Organic materials like wood flour, sisal (jute), cellulose, cotton and powdered coke are used to extend plastic resins, rubber and other polymers. The disadvantages of these fillers are well-known: they are flammable, and they soak up resin, which makes it thick and difficult to work. As a result, many inorganic fillers have gained popularity: their size can be controlled, they are stronger and they generally cost less than organic fillers. While most are inflammable, certain inorganic fillers are particularly resistant to fire.

MICRO-MIX has been compared with 19 other inorganic fillers and found to be equivalent or superior in every case! It is available in a wide range of densities and particle sizes; it has extremely low, oil (resin) absorption, and a very high packing factor, which permits filler loading as high as:

55% for spray-up (resin viscosity - 1200 cps)
67% for casting/rotational molding (2000 cps)
88% for compression molding (aver 3000 cps)

No other fillers can even approach this level of filler loading.

PACKING FACTOR AND FILLER LOADING

Packing factor is the ratio of dry bulk density to true specific gravity. It is a measure of how much filler can be loaded into a resin, to achieve optimum mechanical properties, while still retaining the best working properties of that resin. Whenever a dry filler occupies all the space in a container (as it would for shipment), some air still remains between the filler particles. The fraction actually occupied by the filler is the Packing Factor.

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Spherical particles of one size typically can occupy 52%. of the volume leaving 48%. voids, MICRO-MIX can be blended to occupy as much as 88% of the volume, leaving only 12%. voids.

With a simple filler such as glass beads or calcium carbonate granules, maximum filler loading lies at 50 or 60% by volume. Beyond this, the filled resin would be too stiff and poorly bonded to mold. Nearly all the desired properties would be lost. Filler loading is commonly limited to 30 or 40% at most.

With MICRO-MIX, you can still compression-mold a filled polyester with 75 or 80% filler. The thick and pasty resin can be troweled into place and used for patching. At filler loadings below 67%, MICRO-MIX filled polyesters and other resins can be poured, pumped, or pigmented without difficulty, so long as resin viscosity does not exceed 2000 - 2500 centipoise. Resins of lower viscosity can be loaded with over 50% MICRO-MIX, yet they can be sprayed or painted in the same way as unfilled resin!

WORKING WITH MICRO-MIX

The exact procedures for using MICRO-MIX will vary depending on the kind of plastic, rubber or other resin used, the grade of MICRO-MIX and filler content, use of auxiliary fillers, such as fibers, and many other factors. The examples here can serve as guidelines for your own successful use of MICRO-MIX.

Some typical formulas using MICRO-MIX are given:

	PMM-I	PMM-II	PMM-III
Polyester Resin, Vol% (S.G.=1.1/1.2) (Wt%)	39 (44)	42 (67)	32 (36)
MICRO -MIX 140, Vol% (S.G.=2.48) (Wt%)	21 (50.5)	-- --	7 (17)
MICRO-MIX 100, Vol% (S.G.=0.18) (Wt%)	40 (7)	21 (5.5)	61 (11)
Wood Flour, Vol% (S.G.=0.5) (Wt%)	-- --	37 (27)	-- --
Total Fillers, Vol%	61	58	68
Sp.Cr. of Filled Resin	1.007	0.887	0.640

All three formulas are casting resins with a flexural strength of. about 5,000 psi (3.52 kg/mm^2),. tensile strength of 3,500 psi (2.46 kg/mm^2) and, a compressive strength on the order of 15,000 psi (10.55 kg/mm^2) with excellent impact resistance.

ADDITION OF FILLERS TO PLASTIC RESINS

The order in which fillers are added is important.

1. Start with a resin viscosity in the range of 50 to 300 centipoises. Use a lower viscosity for spray-up; higher viscosities for pouring or compression molding. Control temperature to a constant level of about 25 C (78°F).
2. Use a high-intensity mixer to add heavy fillers, promoters and pigments.
3. Transfer to a slow paddle mixer (6 to 12 revolutions per minute) and add MICRO-MIX 100 or other MICRO-MIX blends. When blended, you may wish to apply a vacuum, removing excessive air, entrapped in the viscous mix.
4. Add catalyst and blend in gently. Aim for a short gel time and use all of the plastic before it sets up. For pouring, it is practical to work with set-up times of 6 to 20 minutes.

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5. If other ingredients are needed (vegetable fiber or fiberglass) add theme after catalyzing.
6. Adjust low viscosity by adding a little silica gel or fumed silica. Adjust high viscosity by adding plasticizer.

[END]