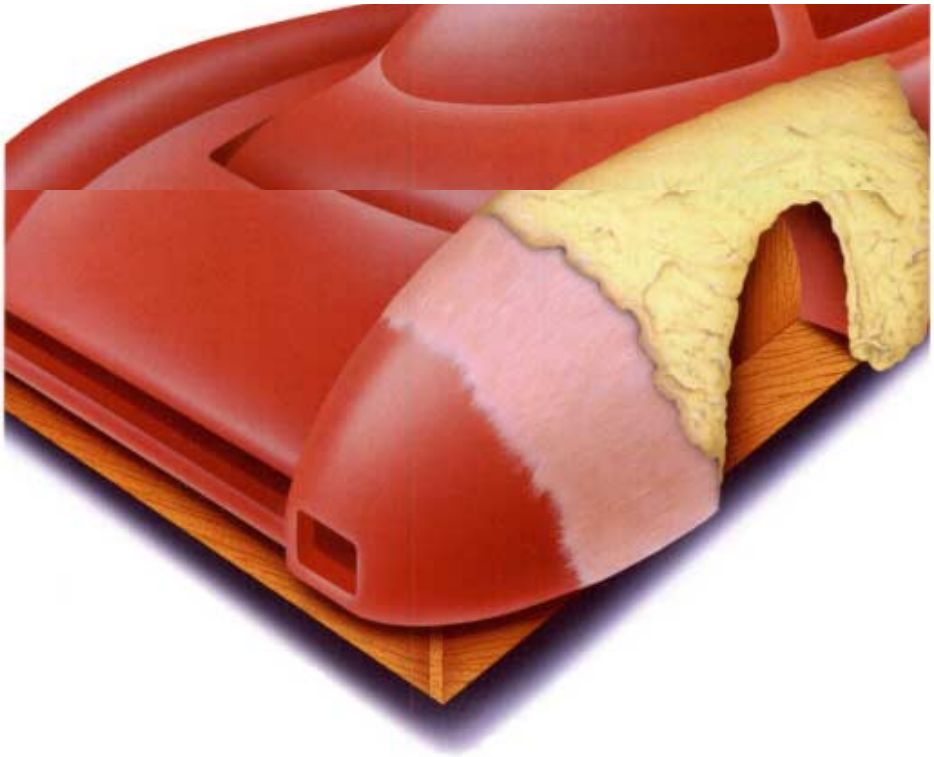
Rayite ™ MDM
Model Duplicating Media
Two Steps To Perfect Model Duplication

United States Gypsum Company



Rayite ™ MDM Model Duplicating Media is a unique two-component duplicating process specifically designed for use with all model and pattern materials, especially oil-based clay products. The formulation of Rayite MDM Model Duplicating Media provides for exacting replication of detail, while minimizing model distortion normally associated with heat-generating duplication products. Developed with Chavant, Inc., it is quick, safe and easy to use.

Rayite ™ MDM-S (Surface) media replicates minute surface detail, while Rayite MDM-R (Reinforcing) media provides reinforcement to the surface coat. Together, these two combine to form a lightweight and strong casting from a variety of pattern materials with minimal model preparation. And removal is easy -- unique "self releasing" properties allow the cast to virtually pop off the model or pattern.

Here is how it works:

1. Prepare model surface: oil based clay or wax patterns need no preparation. If using porous patterns or models that require sealing, such as wood, use a sealer as described in IG326.
2. Mix Rayite MDM-S: Follow the mixing instructions in IG739. Apply the Rayite MDM-S with a disposable brush or by spray apparatus at a thickness of 1/8 " or less. Rayite MDM-S media is specially formulated to "hang-up" on vertical surfaces with minimum drag.
3. Allow the MDM-S coat to stiffen (approximately 35 to 45 minutes): Rayite MDM-S media will begin to "dull out" at this time. Begin preparation of the Rayite MDM-R media.
4. Mix Rayite MDM-R: Follow the mixing instructions in IG739. Apply the Rayite MDM-R media by hand or by trowel to a nominal thickness of about 1". Allow about 1 hour to completely harden.
5. Remove cast: Carefully pry away the cast from the model or pattern If necessary use compressed air to assist. The unique "self-releasing" properties of Rayite MDM media allow the cast to be removed easily.

The casting is now ready to use.

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Specifications

Rayite MDM-S

Use Consistency (cc/100g):	40cc (+/- 5cc)
Vicat Set Time, hand mix:	60 minutes +/- 10 min
Wet compressive strength:	1600 psi
Dry compressive strength:	5000 psi
Wet Density @ use consistency:	120 lbs/ft^3
Dry Density @ use consistency:	100lbs/ft^3
Setting expansion, final:	0.100%
Color	Red

Rayite MDM-R

Use Consistency (cc/100g):	33cc (+/- 3cc)
Vicat Set Time, hand mix:	60 minutes +/- 10 min
Wet compressive strength:	1000 psi
Dry compressive strength:	3500 psi
Wet Density @ use consistency:	90 lbs/ft^3
Dry Density @ use consistency:	75 lbs/ft^3
Setting expansion, final:	0.150%
Color	Yellow

Health and Safety Warning

Warning: When mixed with water, this material hardens and then slowly becomes hot. DO NOT attempt to make a cast enclosing any part of the body using this material. Failure to follow these can cause severe burns that may require surgical removal of the affected tissue. Avoid dust. Dust may cause irritation to the eyes, nose, throat, or upper respiratory system. Wear eye and respiratory protection to avoid irritation. Keep out of the reach of children. Product safety information: (800 507 8899)

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Chicago, IL 60606-4678
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since 1892, the finest name in modeling clay

Detailed Mixing Instructions

The RayiteTM MDM model duplicating system is safe, easy to use, extremely accurate and specially formulated for use with all model and pattern materials, especially oil based clay products. When used properly, the Rayite MDM duplicating system will not cause significant clay model distortion. It is lightweight , yet strong, enabling large casts to be made and handled easily.
The unique formulation of Rayite MDM Model Duplicating Media, Developed with Chavant, Inc., also eliminates the need for parting agents normally applied to non porous models or patterns. An ultra thin film of water develops between the Surface coat and the model or pattern. This self-releasing mechanism allows for easy removal of the Rayite MDM casting from the model or pattern.

Successful mixing and use of Rayite MDM Model Duplicating Media products require following specific standards and procedures. To obtain the full benefit of this product, shop practices and procedures must be standardized. An ideal Rayite MDM Surface (S) or Reinforcing (R) mix is one in which the powder particles are completely dispersed in the water to produce a uniform, homogeneous slurry. Such a mix should be the goal of every shop, and extreme care must be taken to control variables such as batch size, mixer design, mixing time, water purity, and water temperature. The following information will cover many of the factors that determine production of an ideal Rayite MDM mix.

Water Purity

Water used in mixing Rayite MDM model-duplicating media should be as pure as possible. If water is drinkable, it is probably suitable for the mixing of Rayite MDM slurries. In many cases, water for

industrial use is taken from contaminated sources and is high in organic impurities that lengthen the setting time. Other contaminates could negatively affect the slurry and ultimately the finished cast.
Water Temperature
Since Rayite MDM Model Duplicating Media has maximum solubility at 100 ºF, variations in water temperature will affect setting time and can cause difficulty in the control of mixing time. The rule-of-thumb to remember is that cold water retards the set, while warmer water accelerates the set. It is recommended that the water and Rayite MDM Surface or Reinforcing powder combined have a slurry temperature of between 65 ºF and 80 ºF. Wide variations in water temperature can be corrected by using a tempering tank to balance extreme temperature differences. Tank types can range from an automatic system, which blends hot and cold water, to a simple container warmed by waste heat or by air temperature in the shop.

Water to Rayite MDM Ratio
Variations in water-to-Rayite MDM Surface and Reinforcing ratios will affect various performance characteristics of the final cast such as viscosity, ease of application, porosity and overall strength. It is important to control this ratio by carefully measuring each component. Both the Surface and Reinforcing products can be used in a range of ratios, as specified on page four (refer to the Specifications chart for use consistency). It is important to stay within these ranges. Keep in mind that an increase in water to either Rayite MDM-R or S media will make the products more fluid and decrease the strength of the cast.

Soaking
When manufactured, Rayite MDM particles are surrounded by an envelope of air. Part of this air is removed from the Rayite MDM powder particles during shipping and handling; part during soaking. In addition to removing air, soaking allows each Rayite MDM particle to be completely saturated with water so that it is easier to disperse. However, Rayite MDM particles are influenced by additives that may not easily disperse in water. It is recommended that Rayite MDM powder be allowed to soak for a minimum of 1 minute. Any powder that does not sink into the water should be hand dispersed into the water prior to mixing.

Mixing Rayite MDM Model Duplicating Media
Mixing Rayite MDM Surface and Reinforcing medias is the most important function in producing casts with maximum strength, hardness and exactness of detail. Any changes in mixing procedure will have greater effect on the finished product than any other phase of the entire operation. It is also vitally important to always weigh the water and Rayite MDM Surface or Reinforcing powder. Incorrect water and Rayite MDM powder ratios will negatively affect the quality of Rayite MDM casts.
Mixing disperses Rayite MDM particles in the water. Also, the strength of the Rayite MDM cast is partially determined in mixing since there is a direct relationship between energy input during mixing and strength development of the cast.

Equipment Requirements:
- Clean Buckets
- Electric Drill (3/8" chuck or larger)
- Mixing Blades (Jiffy ® brand wood or metal stick, or kitchen wisk)
- Scale (electronic, Balance or Spring)
- Disposable Paint Brushes
- Cup Gun (Model ES-100, Manufactured by ES Manufacturing or R2 All materials Spray Gun, Manufactured by PSH industries).
- Trowel

Prepare the model or pattern, Clay or wax patterns need no additional preparation. Porous models or patterns such as wood require sealing -- follow sealing instructions per IG326.

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Mixing and Using Rayite MDM-S media
Use the Rayite MDM-S estimating chart, Fig.1, for approximate quantities of water and Rayite MDM-S powder. Weigh Rayite MDM-S powder and water in separate containers.

Slowly sift the Rayite MDM-S into the water. Let soak for approximately one minute. If the total mixture of powder and water is greater than five pounds, mix using electric drill and mixing blade. Otherwise use a mixing stick or kitchen wisk to blend. Mix for approximately two minutes. Be sure slurry is lump free. Rayite MDM-S media should have a consistency similar to pancake batter.

Fig.1

Coverage per Square Foot	Rayite MDM-R			Rayite MDM-R		
	Total Mix	Powder	Water	Total Mix	Powder	Water
1	1.25	0.89	0.36	7.5	5.64	1.86
2	2.50	1.79	0.71	15	11.28	3.27
3	3.75	2.68	1.07	22.50	16.92	5.58
4	5	3.57	1.43	30	22.56	7.44
5	6.25	4.46	1.79	37.50	28.20	9.31
6	7.50	5.36	2.14	45	33.83	11.17
7	8.75	6.25	2.50	52.5	39.47	13.03
8	10	7.14	2.86	60	45.11	14.89
9	11.25	8.04	3.21	67.50	50.75	16.75
10	12.50	8.93	3.57	75	56.39	18.61

Unit of measure: Pounds (lbs)

The application of Rayite MDM-S media can be by paintbrush or by spray gun (using equipment made by ES Manufacturing or PSH Industries. Both methods provide excellent results, although the spray application is best suited for large areas.

Using either method, apply Rayite MDM-S media at a thickness of approximately 1/16" - 1/8". Apply more Rayite MDM-S media at corners, edges, or highly detailed areas. The "pot life" of Rayite MDM-S media is approximately 20 - 25 minutes.

Allow the Rayite MDM-S media to stiffen. This takes approximately 35 - 45 minutes (from beginning of mixing time). Rayite MDM-S media begins to "dull out" during the hardening process. Begin preparation of the Rayite MDM-R media at this time.

Mixing and Using Rayite MDM-R media
Follow the Rayite MDM-R Estimating chart for approximate quantities of water and Rayite MDM-R powder (Fig.1,) Weigh Rayite MDM-R powder and water in separate containers.

Slowly sift the Rayite MDM-R into the water. Let soak for approximately one minute.If the total mixture of powder and water is greater than five pounds, mix using electric drill and mixing blade. Otherwise use a mixing stick or kitchen whisk to blend. Mix for approximately two minutes. Be sure slurry is lump free.

Rayite MDM-R media should have a consistency of dough or mortar.
Apply Rayite MDM-R onto the Surface coat by hand or trowel. If the Surface coat appears totally dry, moisten with water. Firmly press the reinforcing material onto the Surface. This minimizes air entrapment. Build up to a thickness of 1/2" - 1". Rayite MDM-R has an approximate "pot life" of 30 minutes.

If necessary, frames, handles or additional support should be added before the Rayite MDM-R media has hardened. This allows the Reinforcing coat to harden around the mechanical additions and provides maximum strength. Use sealed wood, metal, or fiberglass reinforced material. Allow the Reinforcing coat to harden approximately 60 minutes.

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Removing the cast
When the Reinforcing coat has completely dried, the cast can be removed. Begin by prying the cast away from the model or pattern by using a chisel or putty knife. Wedge the cast at several points along the edge. If necessary use compressed air to assist in the demolding. The cast should easily pull away from the model or pattern.

A thin film of water should appear on the surface of the model or pattern. This provides the unique "self-releasing" property of Rayite MDM Model Duplicating Media and is normal.

If more than one hour passes before demolding is done, the cast may be slightly more difficult to remove. Use care when removing the cast under these conditions.

Using the Cast as a Temporary Tool
Casts made from rayite MDM Model Duplicating Media are extremely strong and durable and make excellent temporary tools, check patterns, and molds for use with fiberglass/resin lay-ups, plaster and gypsum cement products, epoxy and many other castable materials.

Surface finishing, if necessary, is easily accomplished using common tools and supplies such as silicon carbide paper (dry) and hand or power sanding.

Once the desired surface finish has been achieved, the casting must be sealed, and a release agent must be applied. Use sealers and parting compounds appropriate for the material to be cast into the Rayite MDM tool.

Sealing: Rayite MDM casts must be sealed before the parting agent is applied. Sealing is particularly essential to prevent dampness from interfering with water sensitive laminating or casting compounds. A quick-drying lacquer applied by brush or spray gun is an excellent sealer for Rayite MDM Model Duplicating Media. Two coats of lacquer provide more resistance to moisture than shellac. Other sealants include polyurethane, acrylic sanding sealers and shellac.

Release or separating agents: for most applications, wax is recommended. Use a wax type and brand appropriate to the material to be cast into the Rayite MDM tool.

MDM - Alternate sealing methods for preparing the MDM mold.
The original MDM literature suggests sealing the completed mold with two coats of lacquer. The following alternative suggestions are summaries and are not specific instructions. Contact the manufacturers to discuss actual applications.

Two alternative methods for sealing the mold, which must be done prior to the addition of a parting/release agent, are the Chemlease USG-1 and Duratec 800-A. The MDM mold will have some retained moisture. These sealers will prevent the moisture from interfering with the release system and or the cast part.

Chemlease's USG-1 is a very thin liquid that is applied by wiping a cotton cloth over the mold surface after saturating the cloth in the USG-1. This can be applied shortly after removing the MDM mold from the plug. The initial coats of USG-1 will soak into the mold very rapidly. Allow a 15 minute flash time between coats and build up 8 - 12 coats. The last coat should be allowed to cure overnight. The beauty to this system is that the moisture in the MDM will not negatively affect the curing of the USG-1. Once dry, a release agent is applied and the part can be cast. Keep in mind that the USG-1sealer is not meant to be sanded so the dried surface is the final surface. Chemlease, International, Inc. (561) 994-8211

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Duratec's Plaster Sealer, 800-A, is a polyester sealer that is catalyzed and applied onto the MDM surface. Because it is a polyester system it is very sensitive to moisture. It is recommended that you wipe the MDM mold with Acetone to drive the moisture away from the surface prior to applying the 800-A. The 800-A is not meant to be sanded. A Duratec Surfacing Primer, #707-002, can be added on top of the 800-A so that a polished surface can be attained. Duratec - Hawkeye Industries, Inc. (770) 977-3336 Bulletin # 9540 explains this option.

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