



Care of Objects Made of Plaster of Paris

Caution:

This Note discusses actions that will physically affect the object, and/or procedures that involve the use of chemicals. Exercise caution, and seek qualified assistance if in doubt.

Introduction

Plaster of Paris is a mixture of powdered calcium sulphate (commonly known as gypsum) and water that hardens quickly. It has been used in a wide variety of decorative applications (e.g. moulds, statuary, casts, etc.) for many centuries. As plaster sculptures can be cleaned, carved, and treated to look like stone, bronze, and other more costly materials, and plaster casts can be finished to look like china or earthenware, it is not surprising that plaster of Paris is often encountered in museum objects as a substitute for stone or ceramic.

Characteristics of Plaster Objects

Composition

Plaster of Paris is prepared by drying gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) in a kiln. This drives off most of the water of crystallization ($2\text{H}_2\text{O}$) associated with the calcium sulphate molecule, and leaves the gypsum very reactive. When water is added to the kiln-dried gypsum powder, it is readily absorbed and becomes incorporated back into the crystal structure. During this process, the plaster of Paris crystallizes and hardens, releases heat, and increases in volume slightly.

The amount of water added to plaster of Paris during mixing is critical: too little results in a powdery material with lower than expected cohesion and a tendency to crumble and crack, and too much produces a porous material that is weak and fragile.

Other substances are sometimes added to plaster to provide strength, colour, and ease of working. For example, if the plaster is to be used for house

decorating, fibrous material is added to act as a binding medium and prevent the plaster from cracking when drilled.

Construction

Some plaster objects are created by pouring liquid plaster into a mould which is then upended and rotated to allow the plaster to coat the entire inner surface. This produces an object with an interior cavity and walls of variable thickness, depending upon how well the plaster was distributed. Some parts of these hollow objects (particularly wide, flat areas) can be very thin and quite fragile. Air bubbles that may have formed as the plaster was sloshed inside the mould can also weaken the structure.

Smaller objects are often made of solid plaster. In this case, the mould is filled completely with plaster and allowed to set without agitation.

The method of construction is fairly easy to determine by the weight of the piece (i.e. solid plaster objects weigh more than hollow ones). Small air bubbles that may have been incorporated into the plaster during casting do not alter the weight of objects significantly.

Structural reinforcements

Metal, wood, textile, and other materials may be incorporated into the structure of large plaster sculptures with thin components. This practice is common in maquettes made to test structural and artistic concepts before the works are created in a more durable material (such as bronze or stone). Some of these models become works of art and sources of information in their own right. Although they often survive much longer than their makers intended, they can suffer from stability problems if the added materials react with the plaster. For example, because plaster is so hygroscopic, any metal reinforcing rods (particularly iron and steel) that are near the surface are likely to be exposed to water and will eventually corrode. As the corrosion progresses, the volume



of the metal will increase to a point where it cracks the plaster. The corrosion products can also leach into the plaster and create unsightly brown and orange staining.

Cleaning

Before cleaning a plaster object, it is necessary to determine whether or not it has been finished, and if so, with what.

Bare plaster is very porous and hygroscopic, and any water that comes in contact with it will create tide lines and staining. Also, because water is so easily absorbed, dirt or other contaminants dissolved in the water will be carried readily and irreversibly into the plaster. Bare plaster must therefore be cleaned very carefully.

Note: Objects made from unfinished plaster may be maquettes or trial pieces, and the surface could include pencil lines, lettering, or other marks that indicate the artist's measuring techniques or notes on fabrication. As even light cleaning could obliterate this information, it is important to examine the surface of unfinished objects very carefully before commencing any kind of treatment.

Begin cleaning by dusting the object with a brush, directing the dust into a vacuum cleaner. Padding the nozzle of the vacuum cleaner with cloth or thin foam plastic will help to avoid damage to the object. Resistant dirt can be removed with a rubber eraser or draftsman's eraser powder although these techniques should be used cautiously (they can work very quickly and selective overcleaning could result in an unsightly appearance).

Finished plaster objects present fewer problems as the finishes are often quite durable. In addition to the dry cleaning methods already described, these items can usually be cleaned with cotton swabs moistened with distilled water to which a little detergent has been added. However, because water-sensitive resins such as shellac were occasionally used to seal plaster surfaces, and finishes may have been used in combination with pigments and waxes to simulate patination, caution is always necessary. Therefore, be sure to test unobtrusive spots before attempting widespread cleaning. If the test swab shows even the slightest coloration, limit cleaning to dry methods.

Do not attempt to remove staining that is the result of corrosion of metal within the object. This problem should be referred to a conservator.

Handling

When handling bare plaster, always wear clean cotton gloves to avoid transferring moisture and oils from the skin to the surface of the object. Bare plaster should also be kept covered to avoid dust and staining from leaking water.

Before attempting to move a plaster object, assess its total weight and the distribution of that weight. When lifting the object, grasp it by solidly attached parts and support it well from below.

If the object is to be carried a short distance, plan the route to be taken and prepare a place for the object to be deposited in advance. The final resting spot should have a padded surface where the object cannot roll.

Transporting plaster objects requires special precautions to protect these seemingly robust items from physical shock and vibration. Larger objects pose a greater challenge than smaller ones in that they may have extended, unsupported elements that are at increased risk. Heavy works often suffer repeated damage from prying on the underside edges in an effort to lift the object or gain access with lifting or moving devices. It would be wise to consult a conservator experienced in the care and handling of large or fragile plaster objects (i.e. those that cannot be lifted easily by one person) before attempting to move such items.

Repair

Plaster of Paris is a common substance that is easy to use, but its repair and restoration are surprisingly difficult and complex. When repairs are made to a plaster object, it is quite common for the added wet plaster to lose water to the dry material surrounding it. This can make the fill material weaker than its surroundings, and more likely to be damaged. Repair of broken parts should always be referred to a ceramic or sculpture specialist.

Display

Plaster sculptures and other large objects should not be displayed outdoors. Although they may be painted or finished to represent durable outdoor materials, they are subject to serious damage if water seeps in through cracks and gaps in the finish.

Objects displayed indoors should be protected from casual handling by barriers or other display furniture.

Ensure that objects are stable and will not rock or tip if the display is accidentally jogged or moved.

Bibliography

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